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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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CW Photo by R. Frank

NBC-TV's David Brinkley and John Chancellor talk to former Georgia Gov. Jimmy Carter after the network's IBM 370/145 said he had won the New Hampshire Democratic primary.

TV Network's DP Network Vital In Predicting Primary Returns

By Nancy French
Of the CW Staff

MANCHESTER, N.H. – To predict election outcomes for TV audiences when only partial returns are in, NBC-TV's John Chancellor, David Brinkley and their writers need access to millions of bytes of data on the particular election involved, as well as historical information on voter performance and preferences in the past.

Broadcasting the results of the New Hampshire presidential primary from a temporary studio at the Sheraton Wayfarer Inn here last week, writers had access to that information thanks to a computer network that tied the studio to NBC's mammoth DP center in Cherry Hill, N.J., network headquarters in New York City and the News Election Service (NES) computers in Concord, N.H., and New York.

Networks like this are a year-round concern for Alan Smith, manager of technical projects for NBC's Elections Unit.

By the time the presidential primaries are over, Smith's team will have set up, activated and torn down at least five of these one-day networks.

Although each site is operated for only a matter of hours, the equipment must work flawlessly or NBC's multimillion-dollar investment in equipment and personnel for election night programs would be wasted, Smith said.

Projecting the outcome of the New Hampshire and other primaries as well as

(Continued on Page 4)

Computer Caravan Takes to the Road

WOBURN, Mass. – Computer Caravan 76 will take to the road on a nine-city tour which starts here tomorrow and features a user-oriented seminar program plus a wide range of exhibits.

More than 50 companies will be showing hardware, software and services in three of the cities – New York, Chicago and Los Angeles – while about 40 exhibitors will participate in the other cities.

After leaving this Boston suburb, the Caravan will visit New York; Washington, D.C.; Atlanta; Detroit; Chicago; Dallas; Los Angeles; and San Francisco.

CompDesign/76, an OEM show sponsored by *Computer Design* magazine, will join the Caravan in five cities:

(Continued on Page 2)

Vote-Card Switch Prompts Suit Challenging Outcome Of Mayoral Race in Mich.

By Catherine Arnst
Of the CW Staff

FLINT, Mich. – An accidental switch of the computer cards in two voting devices influenced the outcome of the mayoral elections here last November, according to a recently filed lawsuit.

The "error" occurred in two precincts' Votomatic devices, which are small machines in which the voter punches a hole next to his candidate's name into a computer card inside the device.

In Michigan, the names of candidates are rotated on the ballot in every other precinct; a candidate's name would be on top of the list in one precinct and on the bottom in the next.

Two of the nine ballot books in the Votomatics in precincts 51 and 52 were switched so that a vote cast on those devices for one candidate would be tallied as a vote for the other candidate.

The cards themselves are not marked with the candidates' names. When they are tallied by the city's computer, all the cards in each precinct are tallied together.

There is no way the card can be traced back to the individual machine, and there were five Votomatics in one of the precincts and six in the other. Consequently, all 746 votes cast in the two precincts are in dispute.

The election was won by James Rutherford by a margin of 206 votes out of 42,000 cast.

The error was discovered only because a recount was ordered because of the closeness of the election. Even then the mistake was missed in Precinct 51; no error was realized until the votes in Precinct 52 were recounted.

"There was a foul-up when the booklet was inserted into the Votomatic prior to the election," City Clerk Gerald Brown said, even though the election workers had been given extensive instructions to check the booklets.

Both the losing candidate, Floyd McCree, and the League of Women Voters have filed suit with Genessee Circuit Judge Ollie B. Bivens Jr. requesting that the entire election be rerun.

It is believed there has never been an error of this type in Michigan or any other state before.

In other cases where election errors have occurred, there have been perhaps a 50/50 split on whether the election should be rerun, Barry Moon, attorney for the league, said. In New York State, "the general rule has been that, if there is more than a 3% chance that the outcome of an election would have been reversed because of the error, there is usually a new election," he said. In Hawaii, however, one chance in 100 would require a new election to be held, he said.

The Flint election is a test case in that it will decide the question of what a court's position should be in relation to the implications of a computer error on the

(Continued on Page 2)

Sophistication to Outpace Innovation: Compcon Panel

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – Continuing growth in the use and sophistication of DP systems but little in the way of innovation are the prospects for the next five years, according to a panel of speakers at this year's IEEE Computer Society Compcon 76 spring meeting held here last week.

Changes in the typical installation's mode of operation will occur, they agreed, but the changes will be based primarily on technology that has already been developed.

While each of the panelists focused on a separate aspect of the DP scene, the tone of the presentations was remarkably uniform and, in the view of many in the audience, remarkably gloomy.

Voicing the feelings he sensed around him, Isaac Auerbach, founder of Auerbach, Inc., characterized the session as "the most sober" one he had heard in a long time.

Earlier Robert McClure of Palyn Associates in Palo Alto, Calif., outlined his view of software trends. Multiprocessing will finally become widely used, he said, but Fortran and Cobol will remain the most popular application languages – even though they are both far less effective than they might be.

Even the extensions of Cobol intended to provide structured program support "will be almost totally ignored," he forecast, explaining to a questioner that most installations will simply be unwilling to put them into effect.

In much the same vein, J. Michael Galey of IBM/San Jose told the meeting "you've already seen" the next five years of developments in firmware.

Compcon 76 coverage continues on Pages 5 and 6.

There will be much done with the use of microcode, he said, "but it will be with technology developed 10 to 15 years ago for [conventional] software."

(Continued on Page 5)

$200,000 of Goods 'Misplaced'; Theft by Store Terminal Charged

By Catherine Arnst
Of the CW Staff

MONROEVILLE, Pa. – Several employees of Wickes Furniture Store here have been arrested for allegedly taking part in a theft operation in which $200,000 worth of merchandise was stolen over an 18-month period by manipulating inventory data in the company's computer.

Some of these employees, all of whom worked in the warehouse or loading docks, had access to books showing the location of each piece of furniture in the warehouse, according to Nelson Cohen, the assistant district attorney prosecuting the case.

They managed to have different locations for the furniture keyed into the IBM 370/158 at the Wickes headquarters in Chicago through the store's Sanders terminal, he said.

Inventory information at Wickes is input by a keypunch operator and must be approved by the main office, Joseph Miller, the store manager, said. Miller, who was hired after the thefts were discovered, claimed the store does not know who had access to the terminal or how the information was input.

When a stolen item was requested on the terminal during the 18-month period, it was reported as "misplaced." The piece would then be "found" when another piece was substituted for it, which in turn was reported as "misplaced."

Consequently, although no one piece of furniture appeared to be permanently missing, there were always many pieces

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Vote-Card Switch Prompts Mich. Lawsuit

(Continued from Page 1)
outcome of an election, Moon said. "At what point does the court decide a new election should be held?" he asked.

"If the election is allowed to stand, whether the chances of there being a different outcome were one in 2 billion or one in 200, a precedent would be set so that, even if absolute fraud were shown, an election would be allowed to stand," Gordon Suber, attorney for McCree, said.

"There is so much apathy and distrust of elected officials now by the public, how could we tell the voter we can't even assure the accuracy of his vote when he goes to the polls? That would really be the bottom of the pit," he said.

The city's position in the case is that no new election is needed because the effect of the error on the outcome was so small.

Effect of Error Disputed

Dr. Leo Katz, a mathematics professor, claimed in a document filed with the court that the mathematical possibilities of the switch having an effect on the elections outcome was one in a billion.

Richard Rosenberg, employed by the league as an expert, contended Katz used faulty data and assumptions when he assumed the voting devices in the two precincts were used by an equal number of people.

This was unlikely and contradicted by interviews with election workers, Rosenberg said. His findings were that the chances of the switch causing the victory to go to the wrong candidate would be one out of 11.

Rutherford said he feels that, as a general rule of law, it is not advisable to change an election over human error. If there is a new election, however, it should only be held in precincts 51 and 52, he said.

Constitutionally Unsound

"The big issue now is whether there should be an election in just those two precincts or the entire election should be rerun," Moon said. It would be constitutionally unsound to hold an election in just the two precincts in contention, he stated.

The league's position is that to allow only those two precincts to revote would put "a premium on fraud," Moon said.

About 98% of the people would be letting 2% of the people decide an election for them, if only those two precincts revoted, Suber said.

In the future, there will be three additional checks in the procedures after the booklets are inserted in the Votomatics and before the polls open, Brown said.

"When you're dealing with humans there are bound to be errors. Some of these election workers work only three days out of the year. We'll just have to emphasize the checks more in the future," he said.

Possibility of Fraud

Although both McCree and the league agree that this error was accidental, they also claimed the same switch could easily be done on purpose with Michigan's system.

"I'm satisfied that, for a very small amount of money, anyone could manipulate the outcome of an election by getting at just one computer operator," Suber said. "I'd rather go back to hand ballots, where there is less possibility of fraud," he added.

It would be fairly simple to determine which precincts would vote most heavily for a certain candidate and then change the cards in that precinct, Suber and Moon said.

"Those two particular precincts were predictable as to who would be voted for; if there was going to be fraud, those precincts would be ideal," Moon said.

It had been predicted McCree would win over 80% in one of the precincts where the error was made and, "it would not be surprising if he had won over 90%," Suber said.

In the actual election, however, he got less than 60% of the vote in that precinct.

The impact of this error is very severe, Suber said. "And what is the difference between fraud and error?" he asked. "The only difference is the intent of the party. I could be a complete idiot and commit an error just as serious as if I were trying to do it on purpose. The issue of human error will still exist despite any additional checks," he said.

An official with the Michigan State Election Committee said no plans are currently in the works for changing the voting procedures in the state and would not comment on the possibility of fraud with the present system.

Approximately one-third of the state now uses voting devices similar to Votomatic, which was authorized for use 10 years ago. "It's probably the coming thing" for the rest of the state, the official said.

Caravan 76 Takes to the Road; First Stop Woburn, N.Y. Next

(Continued from Page 1)
Woburn, New York, Chicago, Los Angeles and San Francisco.

Representatives of local professional societies, users and consultants have helped coordinate the management workshop program, called the Computer Users' Forum, in many of the cities, according to Edward J. Bride, forum director.

With advance registration for forum sessions running well ahead of last year, it appears a 10% growth in overall attendance – to more than 35,000 – is a realistic expectation, Patrick J. McGovern, *Computerworld* publisher, said.

This Year's Theme

The theme for this year's program will be "Optimizing the Data Processing Investment," he noted, and will be reflected in both the forums and in the exhibits.

Forum topics will include "Management Overview," with workshops geared to installation size, on Tuesday; "Software '76" on Wednesday; and "Computer Networks" on Thursday.

Aside from the forums and exhibits, there will be several free exhibitor-sponsored seminars and tutorials in the afternoons which will focus on "two specific opportunities for increased computer productivity," McGovern said.

"Increasing the productivity of computer systems helps us to better organize and run government, commercial and social organizations. It permits us to provide better services to the citizens, customers and participants of these organizations and can contribute to improving the quality of life for all of our people," McGovern said.

On Tuesday in each city, the Computer Image Processing Division of the National Micrographics Association will conduct a tutorial session on "Optimizing Computer Output."

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Didn't Analyze Right Sites

Consumers Hit Program, Delay Nuclear Power Plants

By John P. Hebert
Of the CW Staff

PORTLAND, Ore. – A consumer group fighting a Portland General Electric Co. (PGE) proposal to build two nuclear power plants here succeeded in delaying a public hearing for a month recently when it challenged testimony based on a computer program.

The public hearing before the Atomic Safety and Licensing Board was to determine whether a permit should be granted to PGE to build the plants in Gilliam County, according to Regis R. Boyle, Nuclear Regulatory Commission (NRC) environmental project manager.

Lloyd Marbet, representing the consumer group, Forelaws on Board, challenged testimony by Boyle based on a computer program used to determine the economics of the proposed nuclear plants as opposed to coal-fired plants, Boyle said.

Marbet objected to the fact Boyle had not directly input the information to the computer system, Marbet said.

Boyle said he had given a series of JCL cards to a terminal operator for input into a government computer located in Oak Ridge, Tenn.

Marbet said it is almost impossible to cross-examine a computer; the only alternative is to compare the results of one computer with those of another.

"We really didn't have the opportunity to run another computer analysis to check the NRC's figures.

"A hand calculator is the only computer we have," Marbet said.

Marbet also objected to the particular computer program used, since it was not based on an analysis of the specific site picked for the plants.

"The [NRC] computer ran an analysis for the regional characteristics of Seattle, Wash., which is about 300 miles from Portland," Marbet said.

For example, NRC didn't look into the specifics of fuel transportation costs, he said, adding, "as long as there was an analysis independent of the one done by PGE – this was the important thing to [NRC], rather than specificity."

Go-Ahead Based on Cost

The go-ahead would be given if the total cost of PGE's analysis were below that of the NRC analysis, Marbet said. "But what if both are in left field?" he argued.

The board allowed Marbet 30 days to examine the computer program and codes under requirements of the National Government Policy Act, according to Boyle.

Marbet, who is not an attorney, said he did win his point when the hearing reconvened in mid-January.

The licensing board ruled Boyle's testimony could be entered into evidence because Boyle had written the program and understood the computer codes involved, Boyle said.

The evidentiary part of the hearing on PGE's proposal was closed, Marbet said. However, PGE has reduced its ownership in the plants by selling part of the project to two other utilities.

This action by PGE has "thrown the hearings back to day one," Marbet said.

The NRC has joined in with the motion of Forelaws on Board for a reopening of the hearing on the utility company's proposal to build the plants, he concluded.

Keypunch Wages Up In 12-Month Period, But Inflation Up More

BOSTON – Although salaries for keypunch operators and their supervisors grew more between March 1974 and March 1975 than in any other 12-month period since 1961, pay raises did not quite keep pace with inflation, a Bureau of Labor Statistics (BLS) report indicated.

Keypunch operators' income increased 9.9% and supervisors' salaries rose 8.7% on the average, while the Consumer Price Index rose 10.3% during that time, the BLS said.

The average increase for clerical and clerical supervisory occupations, the group in which keypunchers and keypunch supervisors were classified, was 9.6%, BLS said.

Average income for the lowest category of keypunchers was $593/mo or $7,114/year. The highest level of keypunchers made $683/mo or $8,193/year, the report said.

Keypunch supervisors were classified on the basis of combinations of three elements: level of supervisory responsibility, difficult of keypunch work supervised and number of employees supervised.

Their average salaries were $766/mo or $9,187/year for Level 1, $883/mo or $10,595 annually for Level II, $998/mo or $11,971/mo for Level III and $1,193/mo or $14,310 annually for Level IV, BLS said.

Salaries were based on employees' straight-time pay, excluding overtime hours. Non-production bonuses were not included, but cost-of-living bonuses and incentive earnings were.

The study covered metropolitan and non-metropolitan areas in the U.S., except Alaska and Hawaii.

Privacy Unit Wants IRS To Alter Disclosure Policy

WASHINGTON, D.C. – The Internal Revenue Service (IRS) Code should be amended to prohibit the IRS from releasing an individual's tax returns to other governmental agencies without the written consent of the individual taxpayer.

That view was expressed in a position paper issued recently by the Privacy Protection Study commission, established by the Privacy Act of 1974 to examine recordkeeping practices in government and business.

Recommendations on IRS information-handling practices now are being circulated for written comment. Verbal testimony also is invited at hearings scheduled for March 11 and 12 here.

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TV Network's DP Net Vital in Primaries

(Continued from Page 1)

developing a picture of why the voters chose as they did requires the use of three principal bodies of information, according to Ron Conrad, manager of news elections.

The first comes from the NES computer in New York. NES was established several years ago by NBC, CBS, ABC and the two wire services – United Press International and Associated Press – to pool election

New Hampshire convention delegate totals were telephoned by radio stations to Rumford Press in Concord, where results were keypunched.

vote counting for the sake of accuracy, efficiency and economy, Conrad said.

The NES data consists of vote tallies, reported by county, on election day. This information is received by telephone at NBC headquarters, where it is keyed in via Sanders terminals and transmitted to Cherry Hill via multiplexed 9,600 bit/sec lines, Smith said.

In all, NBC has three such lines using Codex multiplexers and modems, Smith said.

The second type of information consists of returns from key precincts preselected by NBC for projecting early results. This data is collected by NBC stringers in the field and telephoned to staffers at NBC headquarters where it is also input via Sanders terminals for storage on disk in Cherry Hill.

The third type of data is derived from voter questionnaires, completed by interviewers hired by NBC to talk with voters as they leave polling places.

These interview results are phoned in to operators at Sanders terminals where they are input and transmitted to Cherry Hill.

By 11:30 P.M., when the show goes on the air, a poll of some 1,800 voters has indicated why they voted as they did, Conrad said.

In addition to the data gathered on election day, NBC election analysts have access to historical data showing voter turnout and performance in prior off-year elections to help analysts compare voting behavior in key districts with past patterns.

Three Systems in One

In Cherry Hill, the "special system" used for the primaries consists of three closely related systems. The system used to accumulate and manipulate the vote could be characterized primarily as a number cruncher and modeler, according to Smith.

The second performs mathematical calculations and some modeling and is used to project early results. The third produces reports of vote tallies in preplanned formats.

Most of the election night data processing is handled on a 1M-byte IBM 370/145, according to Jay Hurst, manager of systems planning for NBC's Cherry Hill DP center.

The 145 runs under VS2 release 1.7, Hurst said, and operates CICS. This essentially turns NBC's terminal in New York into a master console, Smith added.

The NES vote tallies are transmitted via 1,200 bit/sec lines to headquarters where they can be examined on CRTs and switched to Cherry Hill for storage on disk.

Since CICS can't capture uncontrolled data of the type fed by NES, a program termed "The NBC Data Collector" was written to read the lines of data as they come in and put that data out to CICS, Hurst said.

This extra program wasn't needed until the NBC center switched from its old RCA equipment to IBM earlier this year, Hurst said.

RCA's Communications-Oriented System, in addition to doing just about everything else that CICS does, can also handle uncontrolled data, he added.

Dial-up telephone lines, multiplexed to handle up to 30 transmissions simultaneously, are also used to tie six portable terminals in a broadcast studio to the Cherry Hill DP center, Smith said.

"We use dial-up rather than leased lines for temporary installations like this because they're a lot more reliable. If a line goes dead, you just dial again," he said.

Data is transmitted on a transaction basis rather than waiting for an inquiry, he said. However, analysts in the studio also may retrieve specific reports by inquiring.

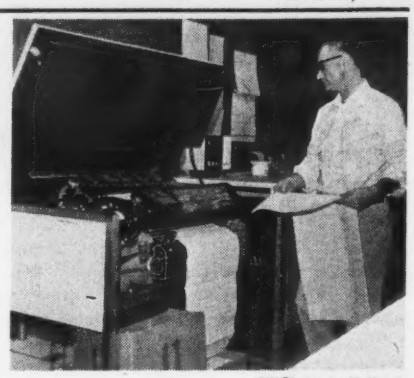
As new data is fed to the studio via the conglomeration of portable terminals, it is digested and analyzed, and stories are written for the broadcasters who give that information to viewers in their homes.

Effective Backup Crucial

Since this operation is so crucial, Smith and Hurst take great pains to provide effective backup, Smith explained.

If the Sanders terminals in headquarters go down, the key precinct tallies and interview data can be keypunched and fed via two remote job entry terminals in New York which are linked to Cherry Hill, he explained.

As for CPUs, a 168 is available at all times for processing if the 145 should crash, he said. In addition, the disk drives have controllers with two-way switches enabling the disk files to be automatically



CW Photos by R. Frank

The Associated Press, United Press International and NES ran New Hampshire delegate vote totals on this Honeywell 2030A in Concord. A Cobol program was written for the election; 14 cards were required for each reporting precinct because of the large number of Democratic candidates.

visible from either the 145 or the 168, Hurst said.

Primary night processing takes about 200 cylinders of disk storage, he said.

The data base is also stored on tape, but the tape is used only as backup.

While the New Hampshire primary was a massive one-time only job, it was a small project compared with the processing and communications effort planned for the national election in November, according to Smith.

The DP center will begin rehearsing election night 1976 in late August, Hurst said – but that's another story.

Theft by Terminal Charged at Furniture Store

(Continued from Page 1)

"misplaced," Cohen said.

It is common for stores to have furniture misplaced, but not as consistently as at Wickes unless theft is involved, he claimed.

There were, however, no checks above the accused employees in Wickes to see what they were doing, Cohen said. "No one said, 'What the hell is going on?' " he said. Instead, the store continuously kept replacing managers during the period these thefts were occurring.

The accused employees, who include the warehouse foreman, dock workers and truckdrivers, allegedly sold the furniture from the warehouse, where it was loaded either on Wickes trucks, trucks subcontracted by Wickes or trucks owned by the furniture buyers and delivered.

There were some cases of furniture being sold piecemeal, Cohen said, but in most cases entire sets were sold, such as living room or dining room sets.

The operation was uncovered in September when the wife of an employee, while waiting outside the store near the loading docks, thought furniture was being loaded in a suspicious manner and notified the store manager, who called the police.

Arrests have been ongoing since then, with a series of 12 occurring in late January. Police are continuing to make arrests, Cohen said, and he estimated the number could go as high as 20.

These include people who are said to have received the stolen goods, he added.

Three warehouse employees who worked for Wickes "for a good while" and two truck drivers have been arrested, Cohen said. The district attorney's office is now trying to discover if anyone else was involved in the operation, he added.

"No one in the store had to be educated in the use of the computer by someone outside," Cohen stressed.

Wickes has since installed tighter security measures and it is "highly improbable" that such an operation could occur again, Miller said.

AMA Schedules Privacy Briefing On State, Federal Legislation

NEW YORK – A briefing on how both personal privacy and DP investments can be protected will be given here March 15-17 by the Center for Management Development of the American Management Associations (AMA).

The meeting, "Privacy Legislation: Impact on Information Systems," will be aimed at showing how to comply with recently enacted state and federal privacy laws without incurring unnecessary costs.

Key topics will cover the influence of the Department of Health, Education and Welfare's Code of Fair Information Practices on the privacy picture; the directions in which state legislatures are moving; the status of H.R. 1984, the federal bill aimed at the private sector; how government agencies were affected by the Privacy Act of 1974; and the probable effects of privacy legislation on future DP technology.

There will also be a case history study of a specific government agency and the technique it used to cost out compliance with the Privacy Act of 1974.

Further information on the meeting is available from Robert Newton of the AMA at 135 West 50th St., New York, N.Y. 10020.

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David Cites Economic Pressures

Trend to Better Planned Research Seen Affecting DP

By Molly Upton
Of the CW Staff

SAN FRANCISCO – A trend to better planned research and development, with risks more easily calculable, will have a major influence on the computing profession, Dr. Edward E. David Jr. told attendees at the IEEE Computer Society Compcon 76 spring meeting here last week.

CW Photo by M. Upton
Dr. Edward E. David Jr.

The change in R&D will reflect the impact of economic pressures, David, former science advisor to the White House, said.

There is growing emphasis on increased R&D productivity, he said, as a result of high interest rates and what he characterized as a "capital shortage."

"There will be great pressure for more incisive use of R&D," especially in the development phase, and projects will have a shorter time span, he said.

Higher payoffs are wanted from R&D since over a five-year span, $1 invested today must net $1.50 to break even.

Economists foresee a capital shortage as the country attempts to pay off its debt and provide to the needs of utilities.

Some see utilities needing as much as $500 billion over 10 years to provide services.

There should be an upturn in government R&D in the areas of defense, energy and health, he said.

Extrapolating this trend of sparse capital, it would seem that "great new uses of technology will continue to be the purview of companies large enough to have the capital," he said.

Another trend is the current feeling that small is beautiful. One element of this phiilosophy is that users want to perceive themselves as being independent. This means, among other things, having a reliable, maintainable system with a backup at reasonable cost, he said.

Technology is probably the most desired commodity with the possible exception of food, David commented, adding it is going to become a powerful foreign-policy tool.

The joint agreements between countries for technological developments can often be of more benefit politically than technologically, he said.

Active Role Urged

People in the DP industry should take a more active role in convincing Capitol Hill on foreign trade legislation, he said. Computers are among the top three exports, along with aircraft and food, he observed.

David said he is inclined to think there will be increasing liberalization of trade legislation.

The movement toward a postindustrial society should see a fine tuning of production control processes and an increased efficiency in transportation, he said.

CW at Compcon 76

Sophistication Seen Outpacing Innovation In Next Five Years

(Continued from Page 1)

In general, the DP community will see "the same slow, painful and stupid" evolution that finally led to an understanding of how to write Assembler language, he said. It won't get any further than that, he added, because there is no basic foundation to firmware: there are "no tools available now" appropriate for delivery to the end user.

Future organizational possibilities for hardware systems are also foreseeable, but in terms of the technology we already have, according to Michael J. Flynn, also of Palyn Associates. He saw a strong need for interpretive computing to cope with a variety of environments faced by many installations.

Even though there is now a well-established pattern to memory hierarchies, Flynn predicted a growth in what he called "one-level" storage, which will provide control of data movement from level to level through hardware control rather than software.

Other possibilities include greater use of distributed computing systems and of parallel processing systems, he said. Under parallelism, he cited an expected growth in both multiprocessing and array systems.

Jack S. Kilby, inventor of the integrated circuit and now an independent consultant, had a somewhat happier view of the future of technology. There will be some changes, he said, but added "the computing industry won't be able to take care of these changes."

As an example of the way in which situations change unexpectedly, he noted that even though many semiconductor circuits are going into general-purpose digital computers, the time will come shortly when hand-held calculators will utilize more of the circuits than all the computers ever built.

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In Presently Static Field

Eckert Calls for Real DP Breakthroughs

By Molly Upton
Of the CW Staff

SAN FRANCISCO – Future developments in computer sciences will be relatively static until real breakthroughs are made in areas such as mass storage, character, voice and pattern recognition and artificial intelligence, according to Dr. J. Presper Eckert, codeveloper of the Eniac computer.

Speaking at the IEEE Computer Society Compcon 76 spring meeting here last week, Eckert called for developers to design systems that can run operations in parallel.

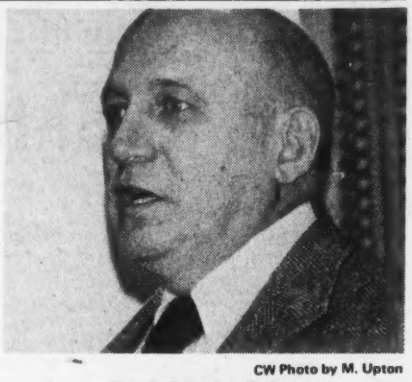
Perhaps the predilection to design systems with central control is a result of how humans are perceived to function, he said.

Microcomputers may be one means of moving away from centrally controlled systems.

Micros definitely have uses in input/output and intelligent terminals, but they may not have a broad place in technology, he said, adding he is concerned about the ability of micros to fit in and maintain a pattern of generality.

Reviewing the past 25 years of computing, he said most of the things he and coinventor John W. Mauchly yearned for in 1943 have been achieved beyond what they could have hoped. These achievements included speed, reliability, memory and lower costs, he said.

But the bad news, he told attendees, is that the problems still exist, such as how to get the data into and out of the system, print it fast, provide enough memory, get the machine to have some recognition ability and primitive pattern-recognition capability.



CW Photo by M. Upton
Dr. J. Presper Eckert

Eckert observed that when he and Mauchly were working on Eniac in the '40s, necessity was the mother of invention.

"I couldn't figure any reason why someone shouldn't have built it 10 years earlier," since the components already existed, he said. The Eniac was constructed to aid in ballistics work during World War II.

After that, nearly every significant breakthrough in DP design had to wait for basic new technology ideas, like transistors and integrated circuits, to develop, he said.

He listed about 120 items he considered significant breakthroughs, when these occurred and how many of them are still in use.

The reason Eniac was an invention people were interested in was that it embodied the new concept of subroutines and had a flexible control system.

Of course, some of the ideas, such as a cryogenic computer, "went Edsel on us," he said.

Eckert segmented the years since 1943 into three eras: 1943-1950; 1951 to 1960, which he called the "growing" period; and 1961 to 1975, the "refining" era.

First Era

The first era was marked by use of existing components, the creation of considerable new systems ideas and a poor understanding of users' needs, he said.

From 1951 to 1960, fundamental progress was slower although there were more developments, he said.

Tape units, mass storage, character-recognition devices, transistors and diodes came into being and software came of age, Eckert said.

During the refining era, Eckert cited from a 10-year-old paper his expectations that it would principally be a time of refinements, especially in speed and storage, with few really new systems ideas. There were a few in communications and time-sharing, he observed.

Small computers would become more important, and software progress would be slower than most had hoped, he said.

'Maturing Period'

Eckert called the present period a "maturing period," awaiting the breakthroughs mentioned previously.

Analyzing when significant breakthroughs occurred, he said 23% occurred in the first period, at a rate of 3.5 per year, and three are still good concepts.

With more people in the computing field, 46% of the breakthroughs occurred in the second period, at a rate of 5.5/year, and 3/year are still around, he said.

In the refining period breakthroughs slowed down to 3.5/year, and only about 2/year are still with us, he said.

He explained that many of the more recent ideas are less basic than those put forth earlier.

Where did these ideas come from? Over the years, Univac and universities have shown a decrease in the number of their contributions, while IBM and others have shown an increase.

Taken as a whole, over 90% came from the U.S., of which 30% were from Univac or its predecessor company; 15% from IBM; 15% from universities and other nonprofit institutions; and 40% from smaller organizations and government laboratories, Eckert said.

He stressed the importance of doing groundwork well to avoid needless failures in experimentation that could cause a delay in the development of technology.

For example, he said, it was important that early attempts with microprocessors went well, since, if they hadn't, the whole micro area might have experienced a 10-year delay.

CW at Compcon 76

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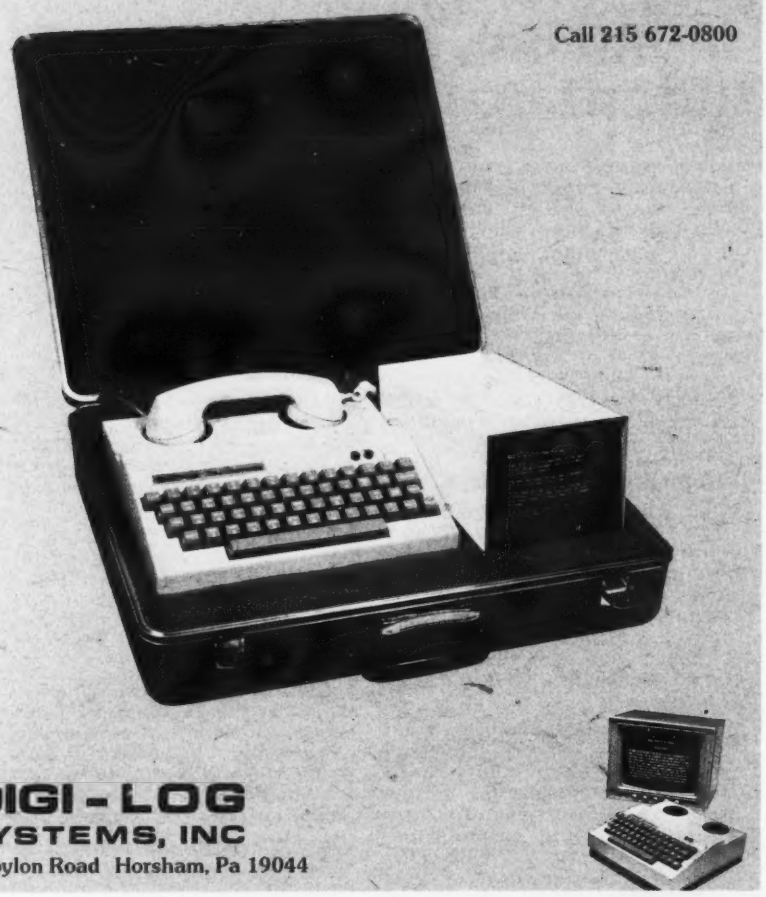

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Companies Admit to Privacy Commission They Share Data Without Telling Subject

By Nancy French
Of the CW Staff

NEW YORK – Local telephone companies, American Express, Bank of America and Sears Roebuck and Co., to name a few, have been routinely providing information about customers' charge accounts to credit-reporting agencies, government agencies and even private attorneys preparing civil suits without first informing their clients, according to testimony given before the Privacy Protection Study Commission here recently.

The revelations met with such apparent negative reaction by commission members hearing testimony that at least one company – American Express – announced two days later it would change its policy.

From now on, American Express said, it will notify cardholders before any files are turned over, except when such a disclosure would interfere with the investigation of a suspected felon.

Sharing Now Routine

Information sharing has become so routine that highly automated organizations such as Sears provide credit bureaus with a computer tape of their customers' monthly outstanding balances so records can be updated every 30 days, H. Randolf Lively, director of public affairs for Sears' General Credit Office, told the commission.

Kenneth Larken, senior vice-president of the Bank of America, defended the practice as one necessary to make intelligent credit decisions. Credit granters have to protect themselves against "the deadbeats," he said.

A second routine practice that caught the attention of both Commissioner Willis Ware and Minnesota State Sen. Robert Tennessen was the bank card granters' routine notification of credit bureaus each time an individual applies for a credit card or bank loan.

When the account is approved and opened, that information is also sent to the credit-reporting agency, Larken explained.

If an applicant is rejected – and about 60% are, according to Larken – that information is kept within the bank.

Through a series of questions, Tennessen drew from Larken an admission that the bank's rejection could be "deduced" from a look at a credit-reporting agency's record on that individual; further, this system provides the companies that access credit reports with no reason for denial.

Coverage of the recent Privacy Protection Study Commission hearings continues on Page 8.

In response to further questioning from Tennessen, Larken admitted banks' criteria change over time and are never provided to the credit-reporting agencies. Rejection at one time can represent a different set of circumstances than a rejection at another time – a fact that goes unreported under present credit reporting practices.

When times are good, banks have more money to lend and are more willing to take a risk on a loan or credit card applicant than when times are bad. Therefore, an individual's inability to secure a loan or a BankAmericard has as much to do with the bank's financial status as his own, Larken admitted.

William Caming, an attorney for American Telephone and Telegraph Co., said although it is company policy to notify customers when records of their toll calls are subpoenaed by law enforcement agencies, customers are actually warned in less than 25% of cases.

There are two major exceptions to the policy, he said. One exception is made in cases where the Federal Bureau of Investigation says an investigation concerns a possible breach of national security; the second is made in situations in which notification would obstruct the investigation of a suspected felon.

Rep. Edward I. Koch (D-N.Y.), a member of the seven-man commission, asked why AT&T's 23 affiliates have not been instructed to require law enforcement agencies to obtain subpoenas before requesting records.

Many subpoenas that are enforceable in court can be obtained without approval by a judge, Caming said. Federal law is "underdefined" on that point, he added.

"We think it's for you, the Congress, to decide where the balance between individual rights and important considerations in an investigation is," he said.

Caming added that customers could obtain information on past requests for toll records and assure themselves of advance warnings on future requests by writing to their local telephone company business offices.

Although most who testified indicated that whether or not they swapped information monthly with credit-reporting agencies, they checked customers' credit standing annually before renewing credit

(Continued on Page 9)

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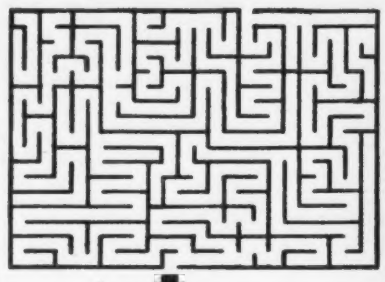

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Data Ownership Still Unsettled

Abzug Says U.S. Government's Privacy Offenses Many

By Nancy French
Of the CW Staff

NEW YORK – A discussion of "unwarranted invasions of privacy" based on access to private data banks would not be complete without a look at the Federal government, "one of the major customers of the credit-reporting industry," according to Rep. Bella Abzug (D-N.Y.).

Abzug chairs the House Government Operations Committee's Subcommittee on Government Information and Individual Rights.

The Manhattan Democrat blamed part of the privacy problem on the fact that existing legislation has not settled the question of who owns an individual's personal data – the person himself or the organization that maintains it.

In support of her charges against the Federal government's "unwarranted" use of private data banks, Abzug said the Defense Department, the Veterans Administration and the Civil Service Commission use credit reporting agencies to check prospective employees, to verify claims, to determine eligibility for benefits and to determine suitability for clearances.

"It is also common knowledge that the Federal Bureau of Investigation (FBI) and local law enforcement agencies have no trouble at all obtaining telephone toll records, credit investigatory reports and other credit information without court orders," she said, indicating her facts came from testimony heard by her subcommittee.

CW Photo by N. French

From left: Ted Jacobs, subcommittee staff member, and Bella Abzug.

Privacy Safeguard

A privacy safeguard she intends to offer as part of formal legislation is an agency that would "oversee the enforcement of the privacy act" and serve as a "permanent monitor" of the private sector's collection and dissemination of personal data, she told the Privacy Protection Study Commission here recently.

That commission's authority is limited to two years of "study" followed by "recommendations" for future legislation.

She urged the commission not to wait until 1977 to offer legislation covering the credit-reporting industry and instead to file at least an interim report on pending amendments to the Fair Credit Reporting Act so Congress could act now.

Abzug added she feared these important amendments may "languish" in the absence of commission action.

Getting deeper into her charges of an improper relationship between the Federal government and the credit-reporting community, Abzug said, every credit-card company and credit-reporting company has a special unit, usually staffed by former officers of the FBI or local police agencies to handle requests from governmental authorities, and the flow of information "is not only one way."

"The Cointelpro activities of the FBI included dissemination of false information to credit agencies and employers on the activists and dissidents who were the subjects of that program," she said.

"Beyond unauthorized government access to private data banks, there is the further problem of the proliferating uses to which computerized credit reporting data is being put," she said.

"An individual might consent to supplying credit information to obtain needed credit, but that data can be sold for any other business purpose without the individual's subsequent consent," she said.

"Thus credit information can be used for insurance placement or preemployment checks – even juror selection."

A Recent 'Holdup'

Abzug cited what she called a recent "holdup" in which New Hampshire consumers were threatened with having their personal, employment, credit and financial affairs opened to "unlimited access by thousands of people," or pay $7.50 for sole ownership of their complete file, with no copies retained [CW, June 18].

The "holdup," pulled by the Credit Bureau of Nashua, was found not to violate either New Hampshire law or the Fair Credit Reporting Act, she said.

Abzug, whose subcommittee has oversight responsibility for the Privacy Act of 1974, said she believes the principles and requirements of that act should be applied to the private sector's "burgeoning" collection of data on individuals.

An estimated 250 million credit cards in use today have boosted the annual volume of credit-card transactions to more than $70 billion, Abzug said.

"There are few things left in our society which cannot be paid for by the use of credit cards – from beauty parlors to funeral parlors and even massage parlors," she said, adding, "all these uses leave a paper or computer tape trail for the inquisitive."

Debit Card Coming

Just beyond the credit card is the debit card, she said, noting that "it is already technologically feasible to create a computerized file for locating the bank accounts of anyone in the country.

"By linking computers in banks and corporate payroll de-

(Continued on Page 9)

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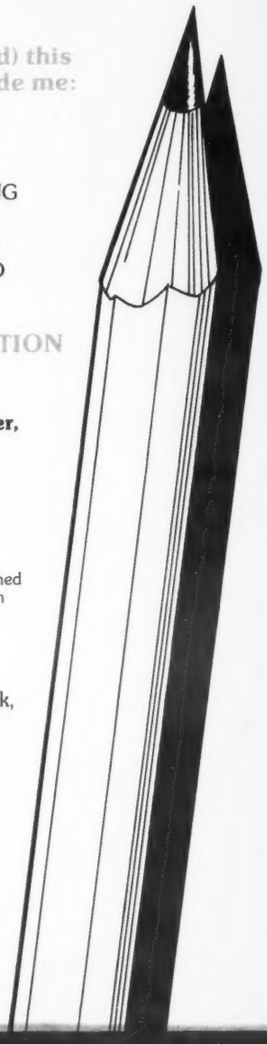

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80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/ Other Communication Service
95 Other: _____

TITLE/OCCUPATION/FUNCTION

11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other: _____

Detach here, fold, and place in post-paid envelope attached through binding.

Major Companies Admit Sharing Data

(Continued from Page 7)

privileges.

Only one – American Express – relies exclusively on its relationship with the customer for credit granting or revoking decisions, according to J.M. Stetler, American Express vice-president.

Credit information provided by the customer is verified by contacts with employers and credit bureaus initially, he said. Once the applicant is approved for credit, no additional credit information is ever collected on cardholders who pay their bills regularly.

Further, American Express does not provide credit balances to credit bureaus. However, upon requests, the travel card company does provide information on an individual account if the information is requested in connection with another credit account the customer is trying to establish, he said.

After about three years, the customer's original credit bureau report is destroyed, and no further information is ever requested from credit bureaus or reported back to them, he said.

Flight Records Available

Max Hopper, American Airlines' vice-president for data processing, testified that only about a dozen subpoenas for records of individuals' flights are received each year. However, he said, telephone requests from government agencies are quite common.

Telephone inquiries are told whether a person was booked on a particular flight, but no records are kept of such inquiries nor are individuals notified.

Bruce G. Curry, a vice-president of the Hertz Corp., told the commission the car rental agency does not furnish information in response to commercial inquiries. It also does not furnish information to government agencies without a subpoena except in criminal investigations, he said.

Edward Prichard, reservation director for the Sheraton Hotel chain, testified that room occupancy information – even the name of an individual who accompanied the data subject – is provided over the phone if the information can be obtained from the chain's central computer.

He noted, however, that about 70% of hotel reservations are made with individual hotels, and he did not know what their practices were when asked for such information.

Federal Offenses Many: Abzug

(Continued from Page 8)

partments to this 'public locator file,' the Internal Revenue Service and other government agencies could gain fast access to comprehensive financial data about individuals, including where their money comes from and how it is spent."

Attorney Jeremiah Gutman, speaking for the American Civil Liberties Union, shared Abzug's views, but voiced still another objection to the credit granters' "nobody is forcing you to do business with us" theme.

"Treating credit-card applicants as volunteers contradicts the practical aspects of living in the modern world," he said.

"It's almost mandatory to have a credit card if you want to take a trip, eat in a restaurant, purchase a gift – participate in modern society," he said.

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The Wang Data Center provides a full range of data processing services from its IBM 370/158 OS/VS-2 service bureau. Applications such as INFOREM (inventory forecasting), Human Resource Management, Letter Writing, and CROSS-TABS (statistical analysis) systems will be displayed at the Caravan.

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Editorials

A Different Tune

When the Privacy Act of 1974 was being considered by the Congress, the private sector made a strong case for exempting itself from any federal privacy law.

Retailers, the credit reporting community and the nation's insurance companies claimed privacy legislation for them was unnecessary. Individual firms had "their own standards," they said.

Conforming to externally set privacy rules would increase their cost of doing business, and those costs would have to be passed on to the consumer, they argued.

So at the last moment, to get a privacy law passed, the private sector was omitted from the act.

Those self-righteous voices sang a different tune when they testified before the Privacy Protection Study Commission in New York a few weeks ago.

One after another, presidents, vice presidents and public relations personnel, bolstered by the ever-present company attorney, told of sending computer tapes detailing customer's monthly outstanding balances to local credit bureaus.

One after another they admitted furnishing subpoenaed customer records to government agencies and even private attorneys preparing civil cases without ever informing the customer involved.

Despite AT&T's policy to notify customers whose toll records are subpoenaed, in actual practice, barely 25% of customers were ever notified by that organization's 23 affiliates, testimony revealed.

Testimony also revealed that the Fair Credit Reporting Act, the Fair Credit Billing Act and the Equal Credit Opportunity Act set the only fair information standards many of these organizations observe.

Where would the consumer be without these federal laws?

The personal information given a credit granter when applying for a charge account belongs to the individual, not to the credit company. It is provided for use in making credit decisions and only for that purpose.

If that information must be turned over to another individual or organization in the process, the information provider should be told. If credit references must be updated regularly, the individual must be told how that will be done.

If record sharing is legitimate and necessary, there would seem to be no reason why this information could not be made freely available right on the credit application.

Credit granters who testified were visibly embarrassed by commissioners' hostile questions on these issues.

As a result of the hearings – and the considerable publicity they received – at least one company, American Express, announced a policy change. From now on, American Express will notify customers before any records are turned over to government agencies or attorneys unless the customer is being investigated for a felony.

The Privacy Protection Study Commission should be commended for its systemmatic, orderly investigation into information practices in the private sector. The Commission is on the way to producing some very important findings that should play a major role in shaping future legislation.

Let's hope that, when their work is completed, the Congress will follow through with equal vigor and concern for the privacy of the individual.

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Letters to the Editor

Council Intended No Overtones Of Legal Action in Letter to HIS

The article, "Users Ask HIS Software Fee End" [CW, Feb. 9], quoted Thomas White (whose name is really William White) as speaking on behalf of the Coordinating Council of the Honeywell Users Group.

White said that strong overtones were made to Honeywell Information Systems (HIS) by the council to either reverse its decision on software propriety or else legal action would be pursued by the council.

I submit that a letter was sent to HIS "urging the return to the policy and practices that were in effect prior to the implementation of the current restrictions on software transferability."

This letter was approved by the council pending official ratification by our respective user groups.

No threats were intended or implied that legal action would pursue, but merely that a discussion would take place at the next session which will be held in Concord, Mass. in July.

By this time a response would be expected from HIS.

A.E. Dodds
President

Canadian Honeywell Users Group
Toronto, Ont.

DPers Can't Have It Both Ways

The recent decision by Judge L. Clure Morton on the professionalism in programming [CW, Feb. 9] and *Computerworld*'s editorial on the same subject [CW, Feb. 16] is of deep concern to this industry.

We can't have it both ways – either programming is professional with "significant independent discretion" having appropriate status, responsibilities and rewards or it is routine with overtime pay, the right to strike, etc.

Nonetheless, it would appear Pezzillo et al. did have it both ways by being the victor in their suit.

Having ripped off the system to the tune of some $100,000, they have managed to twist the entire controversy of professionalism in programming to a question more appropriate for a meeting of Local-310 of the International Brotherhood of Railway Clerks.

Let's hope Pezzillo and friends will now retire with their winnings, leaving others to ponder whether to become drones or professionals.

Unfortunately, the choice may not be entirely optional now that the heavy hand of judicial decision has been felt.

We shouldn't be surprised to see the ambulance chasers start showing up to solicit programmers suffering from financial whiplash because of uncompensated overtime.

Brooke W. Boering

Countryside, Ill.

Playing IBM's Game a New Low

I am amazed Daniel P. Isacksen said in his letter he believes people should try to beat IBM at its own game [CW, Feb. 2]. That could mean sinking to a new low on the morals standard.

IBM treats its representatives as failures if some other hardware or software firm beats them out on a sale.

The representatives, to prevent this, make their pitches to the executives, who are technically unable to challenge their statements. As a last resort, they threaten to cut off "free" services.

If I were in competition with IBM, I would rather take IBM to court than to soil my company by having my representatives play its game.

David R. Hicks

Winnipeg, Man.

(Other letters on Page 13.)

Data Past

Five Years Ago
March 3, 1971

WASHINGTON, D.C. – The Senate Subcommittee on Constitutional Rights opened three weeks of hearings on "Computers, Data Banks and the Bill of Rights" with a call for regulatory control to protect the privacy of individual citizens by Sen. Sam J. Ervin (D-N.C.). The committee's ranking Republican, Sen. Roman L. Hruska (R.-Neb.), took issue with that call, saying proposed regulatory agencies would be "super police."

– – –

NEW YORK – New York City decided to award a computer contract for $291,488 to a firm operating out of Jamaica despite protests from a local bidder. The city had avoided giving the contract to the Jamaican firm, Volt Information Sciences, since it opened the bids in October, although Volt had underbid the lowest local firm by $338,489.

Eight Years Ago
March 6, 1968

NEW YORK – The Electronic Data Processing operation of RCA was renamed the RCA Information Systems Division to better describe the present and future activities of the division and to complement RCA's corporatewide modernization program, James R. Bradburn, executive vice-president of Information Systems, said.

– – –

MOUNTAINSIDE, N.J. – A computer merit badge was recently made available for Boy Scouts and Explorer Scouts who meet certain requirements. The boys of Troop 415 here spent two hours each month studying computer sciences to earn the badge.

Into the Act

Good news from Honeywell, for a change: Level 6 sounds great, and certainly puts them back in minibusiness, which in some sense they sort of abandoned with the General Electric acquisition some years ago. The integrated communications capability also sounds good, although I'm not really knowledgeable enough to make a major judgment. But of what I do try to keep up on, the speeds, the order structure, the memory management, and the limited software all are encouraging.

Of course, to venture out toward DEC, the IBM of the mini world, is not much safer than to buck The Grim Gray Giant itself, and I supposed I could be a critic as usual and deplore opening a second major front while still embattled elsewhere; in military strategy, that can be fatal. But I won't, because of two very different reasons. First, the resources needed on the two fronts are rather different, and especially the amount of sales support required; much, much less for a box to buck the newer PDP-8 models, than a ballroom in which to tango with 370s.

And even Napoleon and Marshal Ney might be forgiven if a second front provided a retreat from Moscow. Probably Keating and Spangler have the possibility at least somewhere in mind: stay in information technology, but get out of big central systems.

Note that new initiatives elsewhere in the Honeywell Grande Armee still point very clearly to retreat on the Winter Front: the decision to buy chips rather than make them, facilitated by the opposite decision on the part of Nippon Electric, whose computer business can hardly be one-fifth of Honeywell's but whose financial resources and governmental support are much larger because of the special Japanese enthusiasm for exportable technology (an enthusiasm not currently to be observed in Ford Washington). And NEC held the Honeywell licenses in the Sixties, so negotiations were easy to institute.

And the signing up of despondent Xeroxers, while not indicating withdrawal, doesn't read like more than a recommitment of hardware and software maintenance troups: good tactics, but not new battalions.

To repeat, though Level 6 makes Honeywell watchers hopeful. Even in the internal arena, men and women who want to contribute to HIS, or just to stay on in Phoenix, will work more effectively if they see new products, new signs of survivability. They may not be directly involved, but they will build and program and sell and maintain the big machines better if the small machines are popular!

Now, gentle reader, look down the lines at another combatant. Just weeks ago Digital Equipment, whose small machines are the prime target of Level 6, made a major announcement, in the big-system business: the DEC 20. Thirty-six bits, yet – do they look forward, to a possible neo-FS nine-bit byte, or backward, to the 701? Anyhow, there it is: a bridge between the few-box DEC systems and the DEC 10; a direct challenge to the bottom of the Univac and Honeywell lines, and most of all to IBM's small 370s.

We only have to look at DEC figures to see the profitability – terrific; better this year than ever. Certainly they can afford a new line, certainly they can write or buy the software, train the sales force, hold the DECUS cocktail parties. Yet I wish they hadn't done it. Here they are, the Campbell Soup Company of computing: ninety percent of the PDP-8 tomato, sixty percent of the PDP-11 chicken noodle, all those canned varieties selling like crazy – and they want to open a gourmet restaurant!

The problems are different, and unlike the Honeywell case, the new ventures are harder. You can buy chips lotsa places – but who's gonna sell you your own fancy OS/VS? If you were clever enough to specify, criticize, and install system software, you wouldn't need to buy it; if you need to buy it, you probably can't tell whether you made a good purchase. Remember FACT, and the first 1107 packages?

DEC 10 has sold well, although rather skimpily supplied with software. But the customers have been university shops, hospitals, and the like – either too clever or too profligate to value bundled software. That's a thin base compared to drug chains and department stores and medium-sized banks, the 370/115 and DEC 20 market.

There was a comfortable gap between the PDPs and the DEC 10; one hardly impacted the other. But the DEC 20 takes away from both – the big PDP-11s and the small DEC10s. Not a major point, but one that IBM has learned not to ignore, since the Twenties.

In sum, then, two major dwarfs have yielded to temptation: "everybody wants to get into the act." The one that makes big goodies, not too well, hopes to make small ones better; I think they can. The one that makes small ones very well indeed wants to make big ones; I wish they wouldn't, in spite of the need for solid IBM competitors.

For the North American user community, by all means if you want a small small machine, look at Honeywell, along with DEC and Hewlett-Packard and one or two others. If you want a small large machine or a large small machine, look at the DEC 20 along with big System/3s and little 370s and the newer Univacs and Burroughses. But be cautious unless you must, or prefer to, do your own software.

Herb Grosch

To Harvest Maximum Benefits

Accounting Should Precede Data-Base Implementation

The Taylor Report
By
Alan Taylor, CDP

Data Bases have been with us for a decade or more, but there are still many factors unfamiliar to many. One problem that came out loud and clear during the National Bureau of Standards/Association for Computing Machinery Data Base Directions conference was that accounting for almost every aspect of data bases is really an ad-hoc adaptation of batch-processing accounting.

There seemed to be no thought-out set of rules that was really suitable for data base use.

Yet data-base technology provides important opportunities for users to band together and obtain multiuse of data-base and computing facilities.

This aspect, as well as others (such as the overhead costs placed on actually performed tasks to support the capability for nonperformed tasks to be available even though unused) means that the accounting methods required have new situations to face.

Old solutions just cannot be mechanically applied in the way that is all too often happening without risking the same loss of data-base usefulness.

Data-base accounting has a number of different aspects, including justification accounting, development funding, etc. But let us look at the final stage, the accounting needed to get the best harvests from the facility.

The view of the final product and its use, rather than the road of getting there over the hurdles of implementation, is where the problem resides.

Harvest accounting is an important aspect in itself. Also, because it necessarily throws some light upon the accounting of the development and justification accounting methods, it should precede data-base implementation planning, at least in outline.

Data Base Applications

Data-base applications can be divided into four groups:

- Owner applications.
- Valued applications.
- Entrepreneurial applications.
- Rental applications.

Owner applications are those which will never be bumped off the system – no matter what. Generally, there is only one such application on a system, although some nonowners are often led to believe their applications have the same status as an owner.

These other applications are often "valued application," not owner ones. The user of a valued application knows he has some value from running his work or obtaining his data base facilities.

He is prepared to pay for the work and even to provide some additional help to set up the system. But if push came to shove, he might find himself thrown off the system or told to get his own data base, "for security reasons" or on some other excuse.

Entrepreneurial applications form a wide variety of applications. An outsider with a bright idea, which might work out and which might not, could be such a case.

Here he would be given time although he can't immediately pay for it in the traditional sense. Probably he would be expected to start paying within a year or so and, when he pays, to pay the owner well. But, he neither pays his way all the time, nor can he stop himself from being bumped off.

Rental applications are just that – applications which are paying their way at some agreed rates, have contractual rights and nothing else. These are the data base equivalents of time sales in batch processing. Indeed, they may well include batch work.

Here no excuse regarding security, etc., is needed to throw them off. Unlike the entrepreneurial applications, they get thrown off if the bills are not paid. Rental applications are good budget balancers and should be regarded as that and little more.

Traditionally, the accounting is based upon taking the cost of the system operation, adding appropriate overheads and then dividing it among the various users on the basis of machine minutes used, etc.

The problem with this method is that people who want to control their costs (which should be everybody) are left almost with giving the data base owner a blank check.

The costs of any particular application becomes not only a variable based upon its own use of the system, but also a variable based upon the lack of use of the system by others! And that simply is not good cost-control practice.

Let me illustrate what I mean. Suppose a system costs $1 million per month and has a hotel reservation and a theater reservation system running on it.

In 1975, let both average 200,000 inquiries per month. Then the bill to each is $500,000 per month, and cost per inquiry is $2.50.

But, in 1976, while the theater business stays at the same inquiry rate, the hotel inquiry rate drops by 50% because of something the theater people cannot control or apparently be held responsible for.

The cost per inquiry, therefore, rises to $3.33, which means a 33% cost increase for theater inquiries as well as hotel inquiries.

What this says is that although the theater people cannot control or apparently be held responsible for the actions of the other users of their data base system, they can be made to pay for them.

This is not a realistic way of operation from a cost-control standpoint. Nor is it conducive to really harvesting the benefits of data bases, an area very crucial to their success.

And that is the problem that will be addressed in a follow-up column next month. Because I think it not only can be solved, but has to be solved before the data base is designed, if the data-base harvest is to be more than marginally adequate.

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SSA Specialist Took Credit For Other Peoples' Work

Recently an article entitled "SSA Planned DP Expansion Called $69 Million Waste" appeared [CW, Jan. 26]. I was one of the people asked to evaluate several reports submitted by Ferdinand Jung which contended the $69 million waste.

Jung refuted the Social Security Administration's (SSA) need for a new computer complex on the grounds that programs within SSA are in bad shape. He also stated that on two different occasions he made suggestions which decreased wasted computer time.

First, Jung claimed credit for suggestions he made that decreased master file record processing by 80% to 90% in the folder control system. Secondly, he claimed credit for a 23% reduction in processing time in the daily health insurance system.

In both cases Jung claimed credit for someone else's work. Let us examine what really happened.

In reference to the folder control system, operations people reported to our software experts a program in the folder control system was taking a lot of runtime and requested a review of the program in order to decrease the runtime.

Jung heard of the problem and made some suggestions to decrease program runtime. Our software experts found Jung's suggestions were not practicably implementable.

The software experts began their normal analysis by running special software program packages against the program. After considerable analysis, the software experts and the programmers responsible for the program located an area of the program where modification could decrease the runtime. Implementation soon followed.

It must be pointed out that programmers routinely analyze programs for efficiency as part of their job responsibilities.

As for the health insurance system, Jung made six comments to Division of Computer Technology personnel which supposedly would increase the efficiency of the daily master file update. Because the comments were general and did not reference any specific area of the program, no savings could be realized.

Review and analysis of this program is ongoing and, prior to Jung's comments, sysems personnel were already involved in an efficiency analysis of the program. After many hours of work reviewing software monitor data, the programmers responsible for the daily master file update noted an area which would possibly save some time.

After implementation of corrective procedures, the problems were resolved, resulting in savings estimated at about 10% of IBM 370 CPU time. Again the programmers were doing a routine housekeeping review of their program.

In both cases SSA programmers saved some computer time. Unfortunately, the computer time saved by the programmers today will, more than likely, be increased by legislative changes tomorrow. It is a constant battle for the programmers to keep efficiency and quality at a premium level.

It is difficult to debate a man who uses character assassination and gross unsupported generalities to be heard. I prefer the truth.

Mark A. McCloy
Computer Systems Analyst
Social Security Administration
Baltimore, Md.

Letters to the Editor

Problem Easily Solved

The problem of the hidden cost of programmer time described by William B. Simmons in "COM Often Not Compatible With Report Generators" [CW, Feb. 9] has been easily solved by us. We too were provided with the CALLed subroutines to produce computer output microfilm (COM) tape and found these cumbersome to use.

Our solution was to write a "driver" program which reads a standard ANS print tape and, based on a few simple parameter cards describing the TITLE and the location of INDEX and fiche BREAK fields on a "printed" page, produces the output tape required for COM. These parameter cards are normally set up by our data control section.

This technique is fully compatible with any report generator package. Also, when the "back-yard" distributed processing suggested by Simmons does become available, as I agree it should, no reprogramming will be required.

Steve Ryder
Systems Analyst
Management Information Center
Texas Education Agency
Austin, Texas

Grosch Missed the Point

Herbert Grosch missed the lesson of machine translation [CW, Feb. 9]. People wanted practical results far too soon; the enterprise failed because of our theoretical naivete about the nature of human language. Meanwhile the sponsors (usually the military) screamed for results.

The same scenario is applicable to artificial intelligence. There is not enough basic research and the sponsors are once again looking for easy practical successes.

At this stage of our knowledge of human intelligence and language, we should concentrate on clever theories and learn most from their failures. That is, we should make them sounder by concentrating on their failures and the improvements based on failures.

Success is a long way off – as any linguist knows who had to face Martin Kay's 90% phenomenon: 90% success is attainable with some effort. Doubling the original effort may yield another percentage.

Clearly we are lacking insight or a breakthrough past the 90% barrier, that is, basic fundamental theory. No amount of "practical fiddling" along will get us there – ever.

Oswald Werner
Evanston, Ill.

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Another 'Project Which Failed'

Pitfalls Lurk If DPer Changes Skyscraper to Church

By Miles Benson
Special to Computerworld

Did you ever see a computing project you would have given your green card, a pair of flowchart templates and your autographed copy of Knuth to work on?

Did you ever make those kinds of sacrifices to get onto the project?

The Sociology of Computing

And did it all turn to card chips when you actually got involved?

Well, that's what happened to Fulton Axeswinger. It was probably the worst experience of his whole computing career. And, I suppose, given the same circumstances, he would do it all over again.

It started back in the late '60s, when Fulton was working for Wings Aloft, an aerospace firm. Wings Aloft had some research funding for various projects, one of which was a generalized instruction-level simulator (ILS).

By means of the ILS, programs could be written for a small computer that didn't yet exist and be executed on a big computer. To Fulton's way of thinking, an ILS by itself would have been a hot apple pie kind of project, and his mouth fairly watered to get at it.

But a *generalized* ILS . . . well, that was like adding rocky road ice cream topping.

Wanting to work on a new project and getting to are two different things. It didn't matter how much salivating Fulton did; his boss didn't want to let him transfer.

If he didn't pull a few political strings, he would never get to work on the ILS. Pulling strings meant going over the boss' head, an activity about as safe as brandishing a Saturday night special around the White House.

And if Fulton succeeded in severing himself from his position, it was an irreversible process.

However, what Red-Blooded American Programmer would let that kind of predicament stifle him? Fulton pulled the strings, stepped through to the ILS project and heard the door slam shut behind him. Rocky Road, here comes Fulton.

Reshuffling the Deck

How can I explain the chaos in which Fulton found himself? While he was off pulling strings and dodging symbolic security officers, Wings Aloft was reshuffling the ILS deck.

Some of the programmers who had been aboard were off in Lower Slobbovia, working on a behind-schedule and in-trouble project.

Worse yet, the team lead, a veteran of many specialized ILS wars, was among them. Fulton had been counting on learning his ILS lessons from him. And the new team lead, unfortunately, was as green a recruit to simulation implementation as Fulton.

There was, on the plus side, a good division of labor on the project. The team lead took over the guts of the simulator from the previous lead, and Fulton worked on some peripheral support modules.

It was a good way for him to break in slowly, and he worked up a storm, and warmth gradually replaced the cold bath of chaos he had felt when he first joined the project.

Moment of Triumph?

As time went on, it became more and more obvious that the new lead was in too deep. Progress in the heart of the simulator was out of synch with the peripheral modules. The lead had too much learning to do, too many people to direct, to also be on top of a major implementation task.

The day finally came when he turned the guts of the simulator over to Fulton.

Moment of triumph, right? Local boy makes good?

At first, Fulton thought so. Pulling all those strings had finally paid off. Now he was the key person on the ILS team.

It was during this moment of victory that things began disintegrating. Fulton looked at the code which the new lead had added to the ILS to supplement the start made by his predecessor. And he shook his head in disbelief.

The new lead had no concept of the techniques of generalizing. He had written some dandy ILS code, all right. But in no way would it work for any but the simplest small computer.

Worse yet, he had chucked out a lot of good code written by the previous lead. Fulton had asked, still finding the status of things hard to believe, for the listings from which his lead had started modifying.

And he had compared the current code with the code the new lead had started with. Change by change, the ILS had gotten steadily worse!

Bad Alternatives

All right, what would *you* have done if you had been Fulton at that point? There he was, working under a guy who didn't know his ILS from a hole in the ground, unable to turn back because of that slammed door, still vibrating, and faced with what seemed at the time like a lot of bad alternatives:

Confront his lead – and have a shoot-out?

Go over his head – and lay the whole scene on his supervisor?

Give in – and continue along his lead's direction?

Quietly do the job right – and face the consequences later?

In perspective, I think maybe alternatives one and two were the best bet. But at the time, Fulton wasn't up to confronting Mickey Mouse.

Fulton's sense of technical integrity wouldn't allow the third choice, and that left only the politically cowardly, technically correct fourth one.

He wrestled with the dilemma a few days, treading water while sorting it out in his mind. And finally, in a surreptitious burst of energy, he started to work.

He had chosen a solution which allowed optimum technical integrity, but still masked what he was really up to. He would retain the programming structure of the new lead, but restore the logic and code of the old.

That's a mind-boggler all by itself. It's sort of like leaving the facade on the Empire State Building, but converting its insides into a 100-story church.

Reinstating old code into a new structure was a fun challenge. The work sped right along, because in reality Fulton wasn't coding, he was just getting to understand the old code well enough to see where it fit in the new structure.

Fulton felt productive, even virtuous; he was righting a technical wrong, while still wearing his Clark Kent costume.

Cards to Chips

That house of cards was bound to tumble. And tumble it did. When Fulton took his vacation, the new lead decided to check his progress in order to report to his boss.

Discovering that his Empire State Building now contained a pulpit and a choir loft did not please him. He did not appreciate the technical beauty of what Fulton had done, nor did he understand why his own code had been all wrong.

All he knew was that Fulton had discarded most of what he had done, and that was enough. He marched off to see his boss.

When Fulton got back from vacation, the whole house of cards had turned to chips. Not only had his lead turned against him, but so had *his* boss.

Fulton's devious path was too reprehensible to make up for the essential rightness of what he had done. The ILS, it was all too obvious, was no longer big enough for the both of them. And Fulton was the one destined to go.

Well, that's the end of a very painful "Project Which Failed" story. What failed, of course, was Fulton's part in the project. The ILS finally made it, in spite of the new lead. He left too, eventually, and Rightness must have returned.

At least, I assume so. I'd sure like to sneak a look at the ILS listings, sometime, and find out what Fulton's replacement did with his inherited Empire State Building that looked, once you got inside, for all the world like a church!

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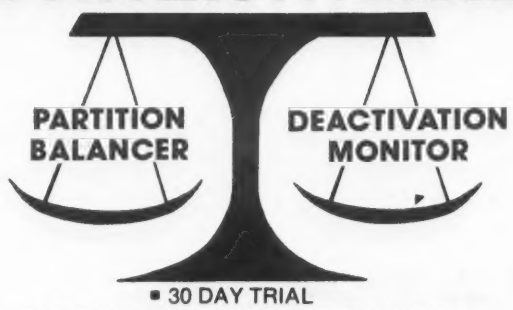

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DG Users Get POS Aid

ENGLEWOOD, Colo. – Software now available from the automated Quill, Inc. (AQI) was designed to help wholesalers and retailers set up a point-of-sale (POS) system based on a Data General (DG) computer with as many as 14 terminals, according to AQI.

Described as a multifunction, multiterminal system, the AQI package supports retail counter sales including charge and cash transactions. Entry of telephoned orders, for later customer pickup or delivery by the merchant, and inventory control are also provided, the vendor said.

Credit checking and entry of customer receipts are supported by the system, which also allows updating of the customer, inventory and vendor data bases, AQI noted.

The full data base is on-line for all functions, a spokesman added, citing customer information, vendor records, inventory data, receivables records, payroll information and purchase order records as the types of information available.

The software is said to provide security through controlled access, lockouts preventing simultaneous updating and a daily transaction file setting up an audit trail.

The AQI approach is more flexible than other POS systems, the vendor claimed, because it includes dynamic terminal function allocation and dynamic peripheral assignment.

The POS package runs on any Data General CPU with at least 32K words of main storage and peripheral storage appropriate for the user's file size. The software is available for a one-time licensing charge of $14,500, AQI said from Suite 7, 3501 S. Corona St., Englewood, Colo. 80110.

From Cornell Research

PL/C Gains Interactive Version

By Don Leavitt
Of the CW Staff

ITHACA, N.Y. – The PL/C Project at Cornell University here has begun distributing two updated versions of its student-oriented compiler for PL/I.

One of the versions, PL/C Release 7.5, includes several major enhancements to the nearly six-year-old software.

The other, PL/CT, is an interactive version of the compiler for use under the Conversational Monitor System (CMS) capabilities of IBM's Virtual Machine Facility (VM/370) or under the Time-Sharing Option (TSO) capabilities of IBM's OS environments.

PL/C itself is an in-core, compile-and-go processor which runs on IBM 360/370 hardware under OS, DOS and other operating systems. There are also versions for 360/370-compatible machines produced by International Computer Ltd., Siemens, RCA, Univac and Amdahl, a PL/C Project source said.

Created originally as a teaching vehicle, PL/C offers extra diagnostic aid in the form of extensive compile- and run-time error detection. The error messages and diagnostic dumps produced by PL/C are all in source language terms and "machine addresses and hexadecimal values are never used," the spokemsan emphasized.

Attribute Included

Along with the "usual" number of minor improvements, PL/C 7.5 includes the PICTURE attribute and conversion between arithmetic and string data types.. Both enhancements reflect a growing interest in PL/C by non-academic installations, the project said.

PICTURE variables in PL/I and PL/C are used to describe specially formatted numbers, including those with commas and decimal points for editing large numbers, "asterisk protection" or a leading dollar sign and the possibility of debit indication on money amounts.

For its part, PL/CT is said to retain PL/C's in-core efficiency and speed. It accepts the same source code as PL/C and, during execution produces identical results. Applications can therefore be developed interactively under PL/CT, then run in batch mode under PL/C or IBM's PL/I (F level), the project said.

The compatibility between PL/C and PL/CT is not surprising, the spokesman said, since PL/CT has been implemented as a set of modifications to PL/C rather than as an entirely new compiler.

PL/C is overlaid and requires a region of at least 90K bytes for the compiler and minimal workspace. More typical, however, is a region of 110K-130K bytes which will accommodate programs of up to 300 statements. PL/C will utilize all the space made available to it, the project spokesman noted.

PL/C is a non-commercial research effort by Cornell University and other interested installations are invited to participate. A research grant of $2,400 is requested from each installation; in return, Cornell provides unlimited use of PL/C and maintenance for the first year.

The research grants sought by the Project in connection with distribution of PL/CT for in-house installation are 25% above those sought for PL/C itself.

The PL/C Project is a function of the Computer Science Department at 421 Upson Hall, Cornell University, Ithaca, N.Y. 14853.

BST Offers 3/10 Spool Package

IRVINE, Calif. – Spool/10 from Business Systems Technology, Inc. (BST) can improve throughput "significantly" on IBM 3/10 configurations by utilizing high-speed disk storage as a buffer area for output ultimately destined for the line printer, BST said.

The performance improvement may be as high as 25%, the vendor claimed, and the package costs $25/mo. But the logic in the BST software requires the use of BST line printers, a spokesman acknowledged.

Spool/10 works in conjunction with BST/45 or IBM 5445 disk drives to interrupt normal print instructions and data, compress them and write them to disk. The interrupt-handling capabilities of BST's 750- or 400 line/min printer can then pull the output from the disk whenever the printer itself is ready, BST said.

BST's spooling is said to provide 3/10 users with several advantages not available to 3/12 or 3/15 shops using IBM's spooler. Unlike IBM's, according to BST, its spooler can be halted temporarily or canceled; printing may be repeated in its entirety or by job on operator intervention.

Spool/10 also operates asynchronously, allowing the start of print operations before the entire print file has been accumulated on disk.

For operation, the BST spooler requires a software modification to the 3/10 system control program, 8K bytes of memory, a 5445-type disk drive and a BST/750 or BST/400 printer.

The control program changes are compatible with all 3/10 user programming, BST noted.

The required use of BST printers will save installations money on equipment apart from the hard-to-define "savings" of improved operations, the independent said.

BST's 400 line/min printer, for example, costs from $108 to $173 less per month than IBM's 300 line/min unit. The 750 line/min BST printer will save the user at least $300/mo compared with IBM's 600 line/min device, BST claimed.

BST is at 3015 Daimler St., Irvine, Calif. 92714.

'Qwik-Screen' Builds CICS Displays

CHICAGO – Qwik-Screen from GMA Software is designed to generate CICS maps or CRT-screen formats on-line through an IBM 3270 data entry console or through execution of a batch version with card input, the vendor said.

The user "draws" the desired screen on the 3270 or on a screen layout form, entering field characteristics with Quik-Screen accepted attribute characters.

The program then generates a documented Assembler language map using the programmer-assigned screen name, plus a generated suffix, as an access key.

An Assembler language table is produced, containing the length, buffer address and attributes of each entry field and the address of the coding that precedes the entry.

This output is inserted directly into the user's program code, bypassing IBM's Basic Mapping logic, GMA noted.

Qwik-Screen is available in object deck form on a license basis for a one-time cost of $1,495. GMA is at 2946 N. Merrimac Ave., Chicago, Ill. 60634.

Updated JOL Eases Creation of JCL

MELBOURNE, Australia – "Numerous enhancements" have been included in Version 3.0 of Clarke Computer Software's (CCS) Job Organization Language (JOL), many of which were triggered by inquiries from IBM 360/370 shops in the U.S., according to the vendor.

JOL is a high-level language like PL/I, used to create Job Control Language (JCL) for OS environments "from MFT to VM."

A major change built into Version 3.0 is the manner in which JOL accesses the IBM System Job Queue, CCS said. Now all Job Queue alterations are made through IBM's own Job Queue Access Module.

Since this is supported by IBM on all its OS implementations, JOL will likewise run on any of those systems, the independent vendor explained.

"Major attention" has been given to restarts and generation data sets, the spokesman continued. Hasp, ASP and JES systems have had an instruction added to facilitate their control cards, he added.

In Version 3.0, a GET instruction allows users to read data into the JOL compiler for examination. An INVOKE instruction permits loading of user routines into the compiler.

The package is available now for a one-time fee of $10,000 or $460/mo. Australian sales are handled by Shell Oil Co. of Australia, 155 William St., Melbourne, Vic. 3000, Australia, while U.S. sales are handled by a CCS office at 575 Madison Ave., New York, N.Y. 10022.

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Argonne Lab Building Packages Of Special-Purpose Routines

By Anne Rabushka
Special to Computerworld

ARGONNE, Ill. – The age of easy-to-put-together modular pieces may be coming to the software field because of work being done at the Argonne National Laboratory here.

Starting in the early 1970s with Eispack, a package of programs for calculating eigenvalues, Argonne researchers have subsequently developed packages of special-function routines and are now working on a collection of minimization programs.

The latest project, involves a preliminary version of the modularized minimization routines that will later be developed for a wider variety of problems and hardware. The routines now encompass 10 basic mathematical calculations used in optimization problems.

Later this year the Applied Mathematics Division at Argonne will distribute preliminary versions of the software to cooperating groups across the country. The list of sites includes the Lawrence Livermore Laboratory, Stanford University's Systems Optimization Laboratory, the Mathematics Research Center at the University of Wisconsin, the Computer Research Center of the National Bureau of Economic Research and IBM's Thomas J. Watson Research Center.

Evolved From Eispack

When the sites complete testing of the software, the programs will be worked into a modularized set to be called Minpack. This development schedule evolved from work on Eispack, a package of program modules capable of performing more than 20 different basic eigensystem computations.

The subroutines in Eispack are designed so each performs a basic step which appears in one or more of the computations, the researchers explained. Consequently, the redundancy (hence the size) of the package is minimized.

Minpack will embody a variety of algorithms – mathematical "recipes" that tell how to do the particular calculations. The software will be designed for specific machines and in modular form.

This will allow programmers to interchange and repeat subroutines in programs, a development inspired by Eispack. Research on Funpack, the package of special function routines, pointed the way to complete error-monitoring modules, so that if a program is likely to malfunction it can be detected early.

Detailing the purpose of the Minpack project, Larry Nazareth of Argonne said "there is a definite need in the user community for a comprehensive collection of optimization routines." The Argonne researchers considered this a fruitful area for further developing the insights into mathematical software engineering gained during the Eispack and Funpack projects, he noted.

"Minpack is an order of magnitude harder than Funpack and Eispack," according to James Cody, another member of the Applied Math Division.

Tested on IBM Gear

At this time Minpack algorithms have been run on IBM 370/195 and 360/75 computers. Experiments with the Control Data Corp. 7600 line will be initiated soon and programs for Univac hardware may be attempted later depending on funds, time and research importance, James Pool, project director, said.

Researchers at Argonne expect Minpack will find a favorable acceptance in the computer community just as Eispack and Funpack did. In its three-year history, Eispack has been distributed to some 350 computer centers using five different types of computers.

A revised second version will soon be released and work on Funpack II is under way. The number of special functions in the latest Funpack version may triple by the time it is released, expanding the circulation area considerably, Cody said.

The first version of Funpack has been released so far to about 150 computer centers using IBM, CDC and Univac machines, he added.

Minpack is part of an ongoing project into quality mathematical computer software funded in part by the Energy Research and Development Administration, which believes mathematical software systems are essential for scientific research on energy problems, Pool said.

But other areas of research may find Minpack useful in solving optimization problems, he added.

Minpack may play an important role in scientific research and economic modeling, according to researchers. Jorge More, who recently joined the project, observed that many of the algorithms included in the Minpack package have already been used to study the efficiency of proposed fusion reactor systems, model the flow of coolant in nuclear fuel pins and solve resource allocation problems.

Argonne acts as a communication center for developments in the field of minimization techniques, Pool noted. The mathematical algorithms

(Continued on Page 17)

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Argonne Lab Creating Modules

(Continued from Page 16)

in Minpack have been designed by researchers from computer centers here and abroad, including Kenneth Brown of the University of Minnesota, W.C. Davidon of Haverford College and M.J.D. Powell of Harwell Atomic Energy Research Establishment in England.

However, the project staff considers its work more of a research venture than a software development task. "The primary objective of the Minpack project is to gain an understanding of the problems of systematizing collections of numerical software," Brian Smith, one of the researchers, said.

By combining a number of programs into one package, software researchers simplify dissemination and maintenance of the programs, Pool said. Users of the packages will find their work simplified by having a collection of tested and certified basic mathematical calculations prepared for them, he added.

"The modularity of the Minpack system allows for the dynamic nature of this field of mathematical software," according to Kenneth Hillstrom, one of the original researchers on the project. He has been working on the programs for about four and a half years.

Many of the techniques used in the minimization programs are based on results published in the past few years and on still-unpublished materials, he pointed out.

Modularity also eliminates code redundancies in the programs and simplifies library maintenance. When updating algorithms, programmers generally modify or replace only one of the constituent components, a task that is considerably quickened with modularity, Michael Minkoff, another Argonne researcher, said.

Two-Part Manual

The Applied Math Division will assemble a two-part user's manual to accompany Minpack when it is distributed to the general public sometime within the next year, just as it did with Eispack, Pool said.

The first part of the manual, intended for the casual user of optimization routines such as a biologist studying cancer growth or a businessman calculating production rates, will give specific instructions on how to use the general routines.

The second section will be written for the more sophisticated user who wants to experiment with the modules. Documentation will cover what the module does, how it works, the information the module requires and what the module will give back to the program.

Even though the Argonne researchers will publish users' manuals for their program packages, the software itself is in the public domain.

"We like to think the things we do are fundamental to research," Wayne Cowell of the laboratory said.

The developers of software at Argonne put a stamp of certification on packages they make available to computer centers, he added. "We stand behind them and fix them if they ever go wrong. It's a kind of warranty," he added.

Tables Set 'Filetab' Logic

ANDOVER, Mass. – Applicable on a range of mainframes, Filetab – now available from Software International Corp. (SI) – is a load-and-go program generator that cuts normal development time by utilizing specifications set up in decision table format, the vendor said.

Developed by the UK's National Computing Centre and heavily used in that country, the package supports both selection and printing of data from files and maintenance and merging of those files. It handles multiple input and output files and includes a sort facility, SI added.

Using Filetab as an alternative to Cobol, some users have had as much as an 80% increase in overall productivity, a spokesman claimed.

On the other hand, the near-rigidity of the decision table approach has been a slight problem to some programmers accustomed to Cobol, another admitted.

Report and page headings are accepted in a picture format. Control breaks, eight levels deep and with as many as 32 totals for each level, are set by parameters.

Filetab does not require specially organized files and can be used as either a supplement to or a replacement of conventional programming methods for those untrained in DP skills, SI noted.

The software has been developed for Honeywell 200/2000, IBM 360/370 and Univac 1100 sites.

The package, purchased by itself, costs $9,000; discounted prices are available if Filetab is used with other SI packages. SI is at Elm Sq., Andover, Mass. 01810.

GATE Checks Passwords Before TSO Command Uses

COLUMBUS, Ohio – GATE, a command to restrict execution access to command procedures under the IBM Time Sharing Option (TSO), is available from The Optionware Co.

The GATE command can be used to specify the authorized users for each restricted command procedure and to optionally require a password.

Source code, object deck, help file and documentation are included in the package for a distribution charge of $60. The Optionware Co. can be reached through P.O. Box 3159, Columbus, Ohio 43210.

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Special UMass 'Track'

Classes Link Accounting, Basics of DP

By Arthur K. Lask
Special to Computerworld

AMHERST, Mass. – The Department of Accounting at the University of Massachusetts (UMass) here is taking steps toward educating future information systems professionals.

A still-developing information systems "track" within the department was designed to meet the needs of students oriented toward traditional accounting and those who opt for a career in the DP profession, according to John G. Burch Jr., the program coordinator.

The four courses designed especially for the track and usually taken during the junior and senior years are:

- "Business Applications of Computer Systems." This course covers a wide variety of computer configurations which relate to business DP.

Exposure to important contemporary and foreseeable computer technology is offered to the students in this background building course via a text, lecture, current periodicals readings and a project involving an actual DP shop.

- "Cobol and Data Base Design." Covering all aspects of ANS Cobol, this course is oriented toward actual programming experience.

Exercises provide opportunities to deal with various file organizations and accessing techniques, typical business-type programming problems, on-line programming and execution, documentation, top-down and structured programming techniques and various data base concepts. This is the only course the university offers which emphasizes Cobol.

- "Analysis of Information Systems." Oriented toward the role of the systems analyst, this course emphasizes the systems development methodology: analysis, general design, evaluation and justification, detail design and implementation.

Having gained some hardware and software insight, students "put the pieces together" by actually working with an organization while performing their systems projects.

While a few students have actually had their "systems" implemented during the semester they are enrolled in the course, several have been subsequently adopted by the companies and other organizations in which the work was performed. Several projects have also led to jobs for students following graduation.

- "Information System Auditing and Control." As the capstone course within the track, this offering explores the control and auditing techniques that are particularly applicable in a computer-based information system.

Students are encouraged to take courses within the School of Business Administration and in the Computer and Information Sciences Department that complement their information systems education. Courses on forecasting and simulation methods, operations management, marketing networks, lower level computer languages, minicomputers and data structures are all suggested areas for study.

While academic accounting departments may not have an aggressively developed programs integrating the information systems concept in the past, the Department of Accounting at UMass is attempting to make up for lost time. In fact, it is striving to develop a model for information systems education which will provide the skills and techniques necessary for both the accounting and information systems professions.

Lask is a graduate student at the University of Massachusetts concentrating in information systems.

An Invitation

Articles with the 'Peopleware' designation attempt to highlight various aspects of educating, selecting, training, motivating and, in general, supporting the people involved in the DP effort.

Pertinent tutorial essays and descriptions of user experiences – from managers of personnel development projects or from staffers viewing the projects from their perspective – are welcome. But they should be limited to about 1,000 words or four double-spaced typed pages.

Readers reluctant to write their own stories but willing to share their experiences are encouraged to contact Don Leavitt at Computerworld, *797 Washington St., Newton, Mass. 02160.*

Peopleware

Courses Set

WALTHAM, Mass. – The Bentley College Center for Continuing Education here has developed a series of part-time courses under the general title "Computing and Management."

Meeting for 10 Thursday evenings beginning March 11, "The Use of Computers in Business Organizations" will focus on concepts that provide management with the tools needed to make informed and effective decisions regarding computer usage.,

Described as an advanced course starting April 28, "Management Orientation for Data Processing" is "for managers whose work entails a high degree of interaction with DP systems and services," a spokesman explained.,

Each of these courses costs $150; further information is available from Bentley's continuing education staff at Beaver and Forest Sts., Waltham, Mass. 02154.

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To Reduce Most Charges

Datran Proposing to Make Datadial Time-Sensitive

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – Data Transmission Co. (Datran) has proposed to lower the cost of its Datadial switched digital service and to make the offering time-sensitive instead of distance-sensitive.

The Datadial changes were filed with the Federal Communications Commission (FCC) as part of a tariff modification scheduled to take effect on April 13, if approved by the commission.

The proposed Datadial tariff changes amount to an overall reduction of about 2% "compared with January-usage levels of existing Datadial customers," a Datran spokesman said. Some specific costs were increased, however.

Second Such Service

If the rates go into effect as proposed, it would make Datadial the second time-sensitive (or non-distance-sensitive) digital service available from U.S. carriers. The other is the Telenet packet-switched service.

The tariff changes establish two Datadial offerings. Datadial I is designed for the user with diverse calling patterns between multiple locations, while Datadial II is best for a user who has significant communications from or to a single location.

Under Datadial I, for zero to 40 hours of usage, the user pays 25 cents at 2,400 bit/sec; 30 cent/min at 4,800 bit/sec; and 35 cent/min at 9,600 bit/sec.

Monthly Usage

For monthly usage of 41 hours to 100 hours, the user pays 20 to 25 cent/min at 2,400 bit/sec; 25- to 30 cent/min at 4,800 bit/sec; and 30- to 35 cent/min at 9,600 bit/sec.

For monthly usage of 101 to 240 hours, the user pays 11- to 20 cent/min at 2,400 bit/sec; 12- to 25 cent/min at 4,800 bit/sec; and 23- to 30 cent/min at 9,600 bit/sec, according to the proposed tariff.

For monthly usage of 241 to 1,440 hours, the user pays 10- to 11 cent/min at 2,400 bit/sec; 11- to 12 cent/min at 4,800 bit/sec; and 17- to 23 cent/min at 9,600 bit/sec.

For usage above 1,441 hours per month, the user pays 10 cent/min at 2,400 bit/sec; 11 cent/min at 4,800 bit/sec; and 17 cent/min at 9,600 bit/sec.

Datadial II Rates

Datadial II is structured like full-period Wats lines with an area defined as zero to 244 miles from the user's location and a region defined as zero to 680 miles from the user's location. Anything above the 680 miles is billed at the nationwide rate.

For the first 240 hour/mo at 2,400 bit/sec, the area rate is $600/mo and $2 for each addition hour; the regional rate is $1,000/mo and $3 for each additional hour; the nationwide rate is $1,375/mo and $3.45 for each additional hour.

For the first 240 hour/mo at 4,800 bit/sec, the area rate is $800/mo and $2.25 for each additional hour; the regional rate is $1,150/mo and $3.25 for each additional hour; the nationwide rate is $1,500/mo and $3.75 for each additional hour, according to the tariff proposal.

All per-minute rates are billable in one-second increments with a minimum period per call of six seconds. Datadial users with random calling patterns will benefit most from the proposed changes, a spokesman said.

A Service Availability Charge or basic fee also applies to the Datadial service and covers "the cost of having system capacity available."

This monthly fee is equivalent to 15 minutes of usage per day per Datalink interface unit, a spokesman said.

Under the Datadial II service, a certain number of stations can be exempt from paying this fee depending on the customer's usage pattern.

The fee is $75/mo at 2,400 bit/sec, $99/mo at 4,800 bit/sec and $115/mo at 9,600 bit/sec for each Datalink unit in the customer's network.

Restructured Charges

Local distribution charges were restructured with reductions at 2,400- and 4,800 bit/sec. Users operating at 9,600 bit/sec located within five miles of the Datran terminal location will have to pay higher rates under the tariff changes.

Datalink rates were reduced at 2,400 bit/sec from $80/mo to $50/mo, while at 4,800 bit/sec the charge was raised from $90/mo to $100/mo and at 9,600 bit/sec the rate went up from $100/mo to $150/mo, Datran said.

In comparing the proposed rates with other services, a Datran spokesman said Datadial I is competitive with Bell's Direct Distance Dial rates for distances over 75 miles, and Datadial II is comparable to Bell Wats rates.

Compared with current Telenet rates, the proposed charges are "substantially less at 2,400- and 4,800 bit/sec" the Datran spokesman said.

IBM Modifies Requirements For Operating in SNA Networks

WHITE PLAINS, N.Y. – IBM has made it easier for users to operate in a Systems Network Architecture (SNA) network by modifying its software requirements.

Users operating with VS1 and VS2 and the Telecommunications Access Method (Tcam) can communicate directly with SNA terminals without using the Virtual Telecommunications Access Method (Vtam).

Previously, teleprocessing users could operate with the 3767, 3270, 3770 and 3600 terminals only by utilizing Vtam with the IBM Network Control Program (NCP/VS). Users of Tcam had to use that access method as a subset of Vtam in order to utilize the SNA terminals.

But software support will be provided "during 1977" to allow users of Tcam to operate with the SNA terminals that utilize IBM's Synchronous Data Link Control (SDLC).

The software change is not compatible with the 3790 terminal system, an IBM spokesman said.

Another Change

In a related software change, users of OS2 will be able to use one access method, Vtam, with the 3767, 3270 and 3770 terminal systems for applications operating under the Time Sharing Option (TSO), Virtual Storage Personal Computing (VSPC) [CW, Jan. 12], CICS/VS, and IMS/VS.

Support will be available in the third quarter for the MVS release of VS2 for the interactive programs and CICS/VS. It will be available in the second quarter of next year for IMS/VS, IBM said.

IBM also said Release 1.7 of VS2 will allow users to operate with Vtam to support the 3767, 3270, 3770 and 3790 terminal systems. Previously this VS2 release supported only start/stop and binary synchronous terminals.

The Vtam operation will be compatible with CISC, IMS, VSPC, JES1, JES2, Power and TSO. This support for VS2 Release 1.7 is scheduled for the third quarter.

The software changes mark the first time TSO will operate with Vtam, an IBM spokesman said.

Monthly Keeps Users Posted on Regulations

BOSTON – A monthly newsletter called *Trends in Communications Regulation* is being published by Economics and Technology, Inc.

The publication is designed to interpret the importance of regulatory events for business users. An initial issue covers recent actions taken by both the Federal Communications Commission and state regulatory agencies.

The newsletter costs $80/year with a free sample copy available from 101 Tremont St., Boston, Mass. 02108.

Rejects Requests to Reconsider

FCC Stands Firm on DAA Decision

WASHINGTON, D.C. – The Federal Communications Commission (FCC) has rejected requests by AT&T and others to reconsider its decision eliminating the need for Data Access Arrangements (DAA) with noncarrier devices. At the same time, the commission postponed the effective date of its new rules by 30 days until May 1.

In rejecting the various requests for reconsideration, especially the contention by AT&T that carrier equipment should not be certified and registered [CW, Feb. 2], the FCC said "none of the arguments raised by the carriers is new . . . it appears that the purpose of preventing harm [to the telephone network] are best served by registration of all equipment."

The commission said all equipment connected to the phone network as of May 1 "may continue to be so connected without registration for the life of the equipment, unless subsequently modified."

"All equipment of a type directly connected to the network before May 1 may be connected without registration until Jan. 1, after which it must be registered, the FCC said.

Equipment Connected Before May 1

All equipment of a type not connected to the network before May 1 may be connected only after being registered by the commission.

The certification/registration procedure by which non carrier and carrier devices can comply with the commission order is specified in a new Part 68 of the FCC rules and regulations available from 1919 M St. N.W., Washington, D.C. 20554.

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To our knowledge, only three computer systems have had better results on the Whetstone than T55. They were the CDC7600, DECsystem 1080 and IBM 360/195. The T55, on the other hand, rated faster than systems such as the IBM 370/155 and the CDC 6400.

While the Whetstone has not been applied to all computer systems, the indication is very strong that nothing within ten times the cost can touch the T55 for FORTRAN execution speed.

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Bank Plans Pilot Test at Cost of Check-Cashing Time

By Ronald A. Frank
Of the CW Staff

NEW ORLEANS – When Chase Manhattan Bank in New York implements an on-line terminal pilot test system within the next few weeks, it may take customers 40% more time to cash a check, according to Robert Hokum, vice-president at the bank.

The test of the Comets system will be conducted in three branches for three months. The system may ultimately service 200 Chase branches and include 1,200 on-line teller stations, Hokum said at a DataComm 76 session here recently.

The check-cashing operation may be slowed down because of the extra time required to enter the necessary data into the terminal. But it is estimated other transactions will be improved, he said, with a possible 30% improvement in a savings account transaction.

The Comets System will have an average design goal of 5 sec/transaction with a maximum of 8 sec/transaction, Hokum said. The system will use a "multistation star" network configuration with dual Burroughs B7700s at the central DP center.

Each branch will have dual DC 140 communications controllers, also from Burroughs, and each controller will handle up to 15 Burroughs banking terminals.

Every teller will have access to a TU 700 terminal for transaction recording and a TD 700 CRT to display account information. Other TD 700 terminals will be used for platform (nonteller) accounting and these will be connected to the DP center through separate lines instead of going through the DC 140 controllers, Hokum said.

The network will operate at 1,200 bit/sec using Bell 202T data sets. The goal is to have the CPU available for 98.7% of the transactions, the communications lines available for 97.5% and the controllers for 90%.

These percentages are based on the total transactions entered into the system and are not a function of time, Hokum said.

Since each branch will have dual DC 140 controllers, a T-bar switch will be used to reconfigure terminals to an alternate controller in case of malfunctions. Ultimately the Comets system may handle 250,000 transaction/day.

A software transaction generator has been programmed to simulate the network transaction load, Hokum said.

Improved Wait Time

Among the expected improvements in bank operations with Comets, Hokum said, are improved customer wait time, better fraud control and less back-counter work.

Key questions to be answered during the test are how much redundancy the network will need, what the line capacity is and whether the built-in recovery schemes work adequately, he said.

Chase currently has 600,000 demand deposit accounts and an equal number of savings accounts which could be served by the network.

Other types of transactions such as Christmas Clubs will also be served, he said.

Tech Control Center Deemed User 'Must' For Multivendor Nets

By E. Drake Lundell Jr.
Of the CW Staff

NEW ORLEANS – A technical control center for isolating problems is a must for users operating telecommunications networks, according to a paper presented at DataComm 76 here recently.

This is because of the multiple vendors involved in such networks, according to the paper by J.M. Hunter of the U.S. Department of Labor.

The "isolation and identification of trouble is the prime factor in controlling downtime," the paper, which was read by a stand-in since Hunter could not attend, contended.

At the same time, "the nature of the remote operator's day-to-day work is such that a communications technician would be under-utilized and get rusty," the paper said.

Therefore the skills needed to perform fault isolation are not available at the remote user site and "if left to fend on their own, [users] tend to utilize the terminal vendor's maintenance personnel as a first line of defense," Hunter's paper said.

That leads to problems with the vendor in many cases, the paper said, and tends to cause problems among the various vendors in the network.

"Thus the concept of a technical control center becomes a necessity. Everyone including the vendor maintenance personnel, has a single point of contact; all diagnostic efforts are controlled and applied in a systematic and methodical manner."

Network troubles can be isolated by such a center, the paper continued, and when reported can be properly identified with the vendor responsible for the equipment.

Important Advantage

The most important advantage of such a center is that the communications personnel in the using organization can establish a "respectable degree of credibility" with the vendor personnel involved in the network.

Furthermore, the rapport that is established between the vendor personnel and the users in the control center "tends to minimize the red tape and provide access to special test equipment when necessary," the paper added.

In another area, the paper warned users to do any demonstration testing on the actual unit that is going to be used in their installations and not on a "similar" model.

For example, the Labor Department tested intelligent terminals for its remote sites. They wanted a system to handle limited batch processing, data entry and emulation of an IBM 2780 terminal.

"We made a selection, a demonstration was successful and we began implementation.

"Our major problem was the 2780 emulator. The demonstration version was found to be a most simple configuration of the various 2780 features. We were never able to handle Ebcdic transparency," the paper said, and that led to shelving the project.

A guide through the Hardware Jungle

How to hunt big gains and avoid white elephants - in our March 29th report on "Stretching Your Hardware Dollar."

If you're shopping around for a way to increase your system capacity without moving up to a much bigger and much more expensive mainframe, then you've probably found that there's no "bargain basement" in DP. Instead, there's a hardware "jungle" of vendors, lessors, systems and peripherals. Most of them are, ostensibly, designed to deliver the added computer power you need for a fraction of the cost. But will they leave you out of the industry mainstream later on? Can enhancements really pay their own way? We'll be taking an in-depth look at questions like these in "Stretching Your Hardware Dollar," appearing in the March 29th issue of *Computerworld*.

Edited by Patrick Ward, this supplement will be filled with application stories and "how-to" tutorials on the ways you can save money choosing and acquiring hardware. We'll look at used machines, minis for offloading applications, and enhancing your systems with independent vendors' memory and peripherals. We'll show you ways to decide how many peripherals you need, and how to determine whether proposed enhancements will pay their own way. The supplement will report on what computers are moving in the used equipment market, and give you advice in looking for leasing opportunities.

If you're in the market for added computer power, you should be reading this supplement in the March 29th issue of *Computerworld*. And if you're marketing dollar-stretching hardware options, you should advertise them here. Don't miss the March 12th ad closing date. Your *Computerworld* salesman has all the details. Or, call Judy Milford at (617) 965-5800.

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Handles Simultaneous Communications

Mini-Based Wiltek II Provides TWX, DP Services

NORWALK, Conn. – Wiltek, Inc. has introduced the Wiltek II, a minicomputer-based, multifunction data communications terminal designed to communicate simultaneously with multiple computers and communication services.

A Wiltek II installed in a typical branch sales office can be used to communicate with a message-switching mainframe for in-house corporate administrative messages, with the Western Union TWX network for typewritten communications with customers and with a DP center at corporate headquarters for inventory status reports and entry of sales orders, the company suggested.

The ability to consolidate several data and message communication functions on a single Wiltek II terminal reportedly cuts communication costs and simplifies operator training by reducing the number of terminals in each location.

The terminal can range from a single-entry message preparation station to a large system with programmability, distributed intelligence and data bases, the company said.

WIN Capability

When combined with Wilcom, Wiltek's communications computer service, the Wiltek II is said to provide an integrated, flexible approach for handling varied communication needs at locations within a corporate network. This combined capability is called Wiltek Integrated Network (WIN).

Communications between a Wiltek II and the Wilcom Digital Equipment Corp. PDP-11 is accomplished over standard Bell System dial-up lines.

Wiltek II components include a CPU, random-access memory (RAM), read-only memory (ROM), a data and control bus, disk storage units, data input devices, printers, power supply and battery backup.

The CPU interfaces directly to the bus and was designed to use a 16-bit word structure with two bytes (8-bit characters) to each word.

The bus serves as a channel for transferring data and control information from one module to another; the CPU enables the terminal to perform up to 16 programs concurrently, Wiltek said.

RAM is used for main memory with up to 32K words (64K bytes) of RAM directly addressable by the CPU. A minimum of 24K bytes is standard; each byte and each word is directly addressable by the software.

The RAM memory stores the operating system and active application programs as well as data. Memory is dynamically allocated depending upon application requirements, the vendor said.

The ROM contains 4K bytes and provides permanent local storage for a bootstrap program which enables the terminal to load the operating system and any required application programs.

The Wiltek II terminal is available with a variety of input devices, printers, storage units and communication adapters.

Input devices include a CRT with display for up to 24 lines of 82 characters each and a range of printers including 10- to 30 char./sec keyboard/printers and 120- and 300 line/min printers.

Storage includes additional RAM (24 bytes) and 256K diskettes.

Communication adapters include 1,200 bit/sec asynchronous or synchronous communication with internal modem for dial-up operation, asynchronous low-speed adapter for external modem (time-sharing); 1,200 to 9,600 bit/sec asynchronous or synchronous for use with external modem; and TWX or Telex.

Terminal Transactions

The Wiltek II provides on-line data entry and inquiry/response to host CPUs. In this mode, the terminal emulates an IBM 3270 on-line data entry terminal, Wiltek said.

If desired, formats can be stored locally. Depending upon the application requirements, communication speeds of up to 9,600 bit/sec are available, the company added.

Remote job entry (RJE) activity is performed with the terminal from host computers using the dial communication port. In this mode, the Wiltek II emulates an IBM RJE terminal.

The Wiltek II operating system supports simultaneous operation of up to 16 programs in a multiprogramming environment. This is accomplished through the use of multiple communications channels and designated application queues in memory, Wiltek explained.

A single message entry version of the terminal costs about $200/mo with maintenance or $8,125 purchase. Wiltek is at Glover Ave., Norwalk, Conn. 06850.

Answer Back Option Added to ADM-3

ANAHEIM, Calif. – Lear Siegler, Inc. has added an option to its ADM-3 video terminal which is said to simplify the initialization message to and from the terminal.

The Answer Bank option is a transmit/receive mode that allows a 32-character message to be sent from ADM-3 by touching one key, the company explained.

Primarily an identification key, Answer Back is a preset message similar to the "here-is" mode of teletypewriters, it said.

A single programmable read-only memory (Prom) chip that plugs into a terminal socket on a separate printed circuit board assembly provides the Answer Back capability. Any 32-character message can be specified by the user and programmed into the chip at the factory, the vendor said.

The Answer Back option costs $85. Lear Siegler is at 714 N. Brookhurst St., Anaheim, Calif. 92803.

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Bits & Pieces

Macro Products Printer Links to HIS 200/2000s

LONG BEACH, Calif. – Macro Products Corp. has introduced a high-speed printer system which is said to be plug-compatible with Honeywell 200/2000 mainframes.

The M470H printer has a controller design that eliminates the need for Honeywell's PA4A peripheral adapter, the firm said.

Thirty-six consecutive characters on the 64-character print drum yield a print speed of 1,800 line/min, the company added, and the entire character set can print more than 1,200 line/min.

The printer is said to deliver a full 132-column format and to handle up to six-part forms.

In a standard configuration, the printer contains 63 printable characters and a space character. Character drums for upper/lower case, optical character recognition and other symbols with a quick change drum feature are also available, the vendor noted.

The 8-channel vertical format control is compatible with Honeywell's tape formats, a spokesman noted.

The M470H costs $38,200, which includes operator training. It can also be leased on a multiyear contract at approximately $800/mo.

The standard maintenance contract is $315/mo, Macro Products said from 3110 E. Willow St., Long Beach, Calif. 90806.

Gould Has Data Logger/Reader

CLEVELAND – The Gould, Inc. 6100 data logger/reader collects, digitizes and stores low-frequency data on magnetic tape for subsequent processing, the firm said.

The portable device is especially intended for use in severe environments such as those found in mobile, marine, airborne and field applications.

The basic Gould 6100 accepts two 8-channel scanner cards and can therefore scan up to 16 inputs. Depending upon the scanner cards selected, the inputs may be all analog or six digital and 10 analog.

Other features of the Gould 6100 include a manual data entry capability to record identifying numbers on the tape; a crystal-controlled elapsed-time clock with continuous indication in hours, minutes and seconds (recorded with each scan on three digital input data channels); and a blank tape seeker that allows resumption of recording after a shutdown without tape positioning error or data loss.

The Gould 6100 costs $5,500 from the firm at 3631 Perkins Ave., Cleveland, Ohio 44114.

With STC Super Disks

User Cuts Cost/Byte of Storage 75%

By Patrick Ward
Of the CW Staff

VAN NUYS, Calif. – A switch from IBM 3330-1 disks to Storage Technology Corp. (STC) Super Disks has brought a 75% reduction in the cost/byte of disk storage at HW Systems, Inc., according to John Settles, a vice-president of that firm.

The Super Disks are "totally compatible with the 3330s they replaced," Settles said. "They're everything we hoped for."

HW, a service bureau, has not rewritten its disk access methods to take maximum advantage of the Super Disk's ability to get more data in one cylinder seek than a 3330. "The difference would not be worth the effort," Settles said.

On the other hand, "if a Super Disk head crashes, you have more data out of commission," he said. However, Settles said he has found the Super Disks to be particularly reliable.

"Also, we do not update our data base on-line. We can recover it from tape without much of a problem," he said.

HW was an early Super Disk customer and had to wait a year for delivery after it ordered the disks at the time of their announcement.

In the fall of 1973, HW was "more than pleased" with the 3330-1s it was using to contain a data base on real estate data for use by title companies.

But "we wanted to reduce the cost of maintaining our data base" even more, Settles said. So HW ordered the fixed-disk Model 8800 Super Disk units, which store eight times the capacity of a 3330-1.

Finally, one year late, HW took delivery of its first Super Disk in October 1975.

HW was initially concerned about the ability of the Super Disk "to handle the constant motion of its seek arms," Settles said. The arms serve the logical equivalent of eight 3330-1 volumes rather than one, he noted.

In some user environments, this design might result in contention problems that would increase response times, he explained.

But the Super Disks can handle the 15,000 inquiry/day (with five or six pages of output for each inquiry) with no performance loss compared with the 3330s, Settles said.

When HW installed its first Super Disk, it initialized the packs and used the drive as eight work areas for a 3.2 million record sort in order to "beat the hell out of the equipment," he said.

After a few hours of this thrashing, "the Super Disk was functioning perfectly with no problems. We copied our data base to it and haven't had a problem since," he said.

"Obviously the cost savings of a Super Disk are lost if you have to back up every one with a removable pack disk drive," he said.

"If there were a catastrophic failure, STC says that within four hours it could have the Super Disk back in operation, but we would have to restore eight logical volumes of data.

"That would take us two and a half hours to restore everything from tape," he said.

HW has a staged data base where 53 million records are on the Super Disks and changes to the data base are kept on a second series of removable pack drives, he said.

MDS 2410 Key-to-Disk Models Support Up to 32 Keystations

PARSIPPANY, N.J. – The 2410 key-to-disk series from Mohawk Data Sciences Corp. (MDS) offers twice as large a processor and support for 50% more keystations than the firm's 2409 key-to-disk series, according to the vendor.

MDS also announced the availability of IBM 360/20 Hasp emulation on its 2300 intelligent terminal. The software is available without charge.

The 2410 series uses MOS memory in comparison with the core memory used on the 2409 models, a spokesman added.

The 2410, now the top of MDS. key-to-disk line, is software-compatible with the 2409 series, but its additional processor capacity (up to 128K vs. 64K on the 2409), allows users more programming capability and concurrent operations.

The 2410 series is intended for "sophisticated data entry jobs" including concurrent spooling, data entry and communications, he added.

The 2410 line includes the Model 2410-1 with disk storage capacity of 30,000 125-character pages; the model 2410-2 with up to 90,000 125-character pages of disk storage; and the Model 2410-3 with up to 150,000 125-character pages.

Each 2410 system can grow from a minimum 64K memory size to a maximum 128K through 16K increments.

System capabilities include table handling, which improves operators' verification and validation abilities while keying data, MDS said.

A Model 2410-3 system with 32 keystations, 150,000-page disk storage, tape drive, data communications and various software features costs about $123/mo per keystation, including maintenance, on a three-year lease.

The MDS 2410 now heads that company's key-to-disk line. MDS also added IBM 360/20 emulation to its 2300 intelligent terminal (shown in foreground).

Deliveries will begin in August, MDS said from 1599 Littleton Road, Parsippany, N.J. 07054.

HIS Offers Series 6000 Package

PHOENIX – Honeywell Information Systems (HIS) is offering a specially priced large computer system from its Series 6000 line.

Called the Model 6031, the package consists of a nonextended instruction set central processor with 131K words of memory, console, disk subsystem with four removable disk units, three 9-track magnetic tape units and tape controller, high-speed printer, card reader and punch.

The total system, with peripherals and Gcos software, costs $432,800 purchase or $10,550/mo on six-year rental.

"The pricing and the package configuration make the Model 6031 attractive for education and state and local government applications where the emphasis is on time-sharing," a Honeywell spokesman said. "Each expandable system may be upgraded to fit user needs as requirements grow."

He indicated the Datanet-355, Datanet-30 or Datanet-305 may be used as front-end network processors in the Gcos 3-D operating environment which permits local and remote batch, time-sharing and transaction processing simultaneously from a common data base.

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Center Shoulders Teaching Role, Gives Each Student T/S Account

By Patrick Ward
Of the CW Staff

LA JOLLA, Calif. – Because the University of California at San Diego "recognizes that computers are going to be a pervasive aspect in students' lives," it has made a time-sharing account available to every student that wants one.

"We feel that teaching students to program is part of a liberal arts education today," according to Ed Coughran, director of the computer center here that serves the university, its medical school and the Sripps Institute of Oceanography.

Coughran's data center serves about 4,000 "programmers," including a mix of students, researchers and administrative users.

There are eight remote job entry (RJE) stations around campus that let users access the university's Burroughs B6700 system, its Control Data Corp. 3600 or an IBM 360/76 at the University of California at Santa Barbara.

Extensive Documentation

"The extensive on-line documentation we've developed" is the main reason students with very little formal training can access to the computer system, Coughran said.

"Students can inquire into the documentation file through time-sharing terminals and receive instructions or guidance," he explained.

"If we can make physicists more productive doing physics and chemists more productive doing chemistry rather than code conversion, then we're doing our job," Coughran said.

On a busy day there are about 40 simultaneously active terminals out of a total of 100. These range from Teletypes to 9,600 bit/sec terminals of "almost every kind," he said.

Any RJE user can determine by the first card of his deck which computer he wishes to use, Coughran said.

The 324K 48-bit word Burroughs system was brought in four and a half years ago "because we felt it was the best system to meet the broad needs of the campus," Coughran said. There were also proposals from IBM, CDC and Univac, he said.

The B6700 replaced an RCA Spectra 70 "that never did the job. The software could never hack it," Coughran said. Conversion from the Spectra to the 6700 "was painful," he added.

The center is looking forward to something like a Digital Equipment Corp. PDP-11 front end. "A B6700 is a pretty expensive PDP-11," Coughran said.

The configuration currently includes six spindles of double-density disk, five tape drives, card readers and three line printers.

NCR Enhances 250 Cash Register

DAYTON, Ohio – NCR Corp. has brought out an enhanced version of its NCR 250 electronic cash register that it said offers improved printing and tax and sales recording capabilities.

The Model 250-7100 replaces the NCR 250-7000. "Since the enhancements primarily involve software changes, the 7100 costs the same as the version it replaces," a spokesman said.

Existing units can be upgraded in the field for about 5% of the original price, he added.

The NCR 250-7100 was designed for use in department stores, specialty stores and other general retail outlets. It can be equipped with a magnetic tape cassette recording device which captures sales information as a by-product of recording a transaction.

The cassettes are processed on a central computer; the 250 can also be polled by a central computer over telephone lines to obtain sales data for subsequent processing, NCR said.

One of the 7100's features is the ability to have up to a 6-digit quantity entry, with an optional decimal point,

Other enhancements include the ability to print an item line plus a second line for other information.

The device provides two tax tables which allow separate totals for retailers operating under multiple sales tax jurisdictions.

It also offers calculation of discounts by line item; multiple payments keys, discount keys and improved controls over the functions of the major department keys; the capability to serve up to 32 salespersons; and program loading by magnetic tape cassette, paper tape or keyboard entries, NCR said.

The Model 250-7100 costs $4,395 from the firm in Dayton, Ohio 45479.

Performance Audits Topic of Workshops

ROCKVILLE, Md. – A monthly series of five-day workshops on "How to Conduct a Performance Audit of Your Computer System" will be held in Washington, D.C., and San Francisco this spring by Keston-Barnett Associates.

The workshops were designed for "top management, DP auditors and DP managers concerned about the growing cost of computer systems and the difficulties in controlling cost-effectiveness," the firm said.

An overview of evaluation techniques covers personnel, system development, application effectiveness, quality control, reliability, security/confidentiality and organization as well as equipment utilization, the firm said.

The workshops will be held in Washington, D.C. on March 15-19, April 26-30 and June 7-11. The San Francisco workshop will be held May 17-21.

Each workshop costs $495/person, Keston-Barnett said from 1010 Rockville Pike, Rockville, Md. 20852.

Raymond Ruggedizes Drive

MIDDLETOWN, Conn. – The Model 6412 ruggedized 1/4-in. tape transport from Raymond Engineering, Inc. was designed to be a low-cost tape peripheral for use in moderate military environments, according to the firm.

The drive is Ansi-compatible with dual gap "read-after-write" recording head.

The unit costs about $35,000. Raymond is at 217 Smith St., Middletown, Conn. 06457.

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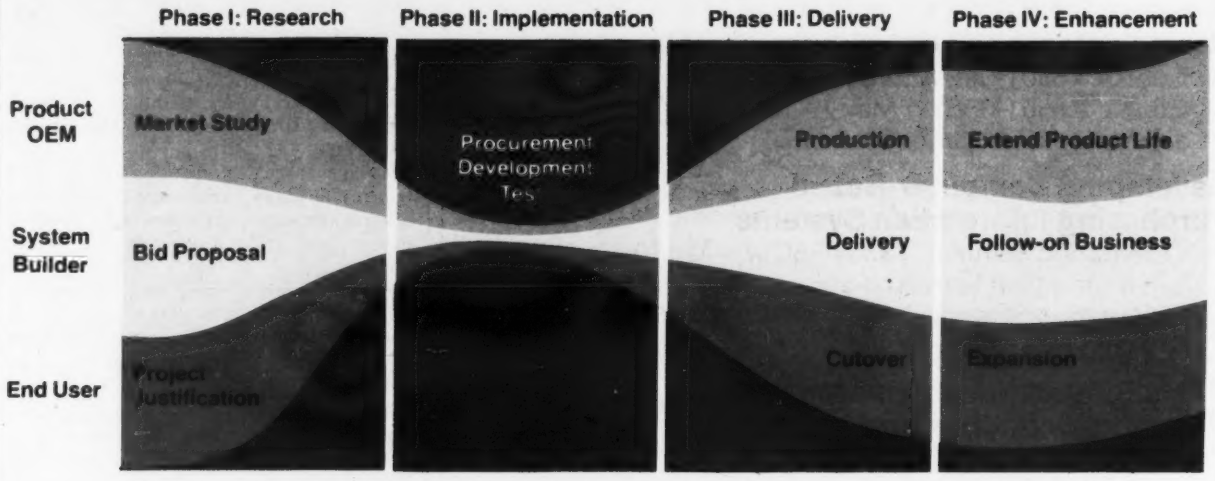

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Multibranch Banks' DP Center Finds COM Saves Time, Storage

NEW YORK – A DP center owned and used by 13 savings banks in the metropolitan New York area has found computer output microfilm (COM) allows it to save both paper and storage space.

Speed of handling output is another advantage, according to Daniel F. De Lucie, assistant vice-president and operations manager at Institutional Group Information Corp. (Igic) here.

Igic supplies its owner/user banks with accounting and management information services for both asset and liability operations.

There is a myriad of paper involved in providing this information to financial institutions. "Some data is used by control people, other data by audit people, so we end up turning out hundreds of reports every day," Max B. Meth, Igic president said.

"Our banks are multibranch and, because we have an on-line real-time system, depositors have been told they can go to any branch to transact their business. So if we gave the branches a branch report, it might not reflect true activity – a customer might have gone to another branch of the bank," he explained.

What each branch needed was a complete record of its customers' transactions within the bank's systems. When Igic depended exclusively on paper reports, the preparation and distribution of those reports in a timely manner became almost impossible.

Storage space also became critical and Igic found many banks were passing their reports through continuous microfilming devices and then discarding the paper, Meth added.

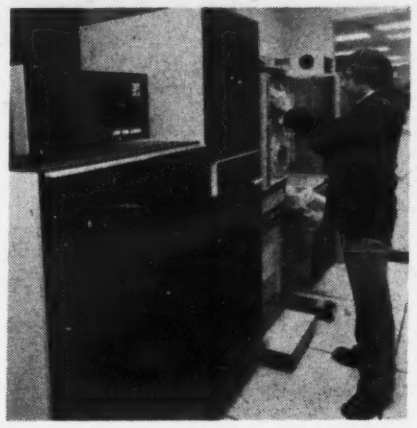
Igic had been running two 1,100 line/min printers and both were overloaded. A further complication was the increasing cost of paper. Last year, printout paper costs rose about 45%.

As an alternative to producing paper reports, Meth, Ludwig and other Igic executives started to search for a COM system.

The center did not want a COM unit that used a chemical bath development process because of the operational difficulties this might entail, Meth said.

That was one reason the firm chose 3M Co.'s Laser Beam Recorder (LBR) COM system, De Lucie added.

The 3M system can reproduce reports at roughly 10 times the speed of a high-speed printer and offers a reduction in output volume of 48:1; these capabilities quickly solved Igic's pressing problems, Meth stated.



Dan De Lucie stands at the COM system that his company acquired to reduce both paper costs and the expense of storing printed reports.

A number of ancillary benefits became apparent after Igic had been using the COM system for a while, Meth said.

- Banks are extremely concerned with the retention of records. They had been taking Igic printouts, microfilming them and then sending the film out for duplication with one copy to be stored in a vault and the other sent elsewhere for reconstruction in an emergency.

By using COM to quickly produce duplicate microfiche, the banks can now elminate a substantial cost, Meth said.

- The system offers an inexpensive way of making copies of reports for each of an institution's branches. With microfiche, a complete record of an entire day's activities can be made on one or two 4-in. by 6-in. films.

All transactions handled by member banks – as many as 150,000/day during interest periods – come into Igic's Burroughs B6700 computers via telephone wires. Igic updates the accounts to reflect each transaction and sends word back immediately to print the new item in a bankbook if it is a book transaction or to display it on a CRT screen.

Tapes from the Burroughs gear are then hung onto the COM unit. The system makes use of a Hewlett-Packard computer which serves as a reformatter. The data is printed on 3M Dry-Silver film.

The COM system "is completely transparent to the programmer when he is coding," De Lucie said. "The tape we mount on the COM unit can just as easily be mounted on a tape drive and printed on paper."

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Mini Bits

AM Designs Turnkey Micro For Graphic Arts Industry

CLEVELAND – The Documentor 3250 is a turnkey microcomputer for the graphics art industry from Addressograph Multigraph Corp. (AM).

It is a modification of the firm's Documentor 3213 system originally designed for the food service industry.

The micro determines paper costs, inventory levels, special or regular collating or sorting requirements and employee time records, the AM firm said.

Estimates of printing jobs can be retained in the system's memory. When the job is completed, the estimate can be recalled and compared with actual costs.

The 3250 costs $7,000 from the company at 20600 Chagrin Blvd., Cleveland, Ohio 44122.

BST Unveils Add-On Memories

IRVINE, Calif. – Business Systems Technology, Inc. (BST) has 48K and 80K add-on memories for the IBM 3/15, housed in controllers for their BST/400 and 750 printer on BST/45 disk drive.

The memories offer cost savings up to 33% over comparable increments of IBM memory, the firm said. Performance of the memories is identical to those of IBM, and no modifications are required to existing user programs, BST said.

On 48K, the BST price is $290/mo on a one-year lease and $275/mo on a three-year lease. IBM charges $393/mo on a month-to-month lease and $375/mo over a three-year period. BST said.

The 80K add-on memory costs $469/mo for a one-year lease and $445/mo on a three-year plan, while IBM's memory costs $619 monthly and $590/mo on a three-year lease, BST added from 3015 Daimler St., Irvine, Calif. 92714.

Interdata Introduces Packages

OCEANPORT, N.J. – Users can save about 20% by purchasing Interdata, Inc.'s packaged Ipac/16 and Ipac/32 systems rather than individual system components, a spokesman said.

The Ipac/16 includes a Model 6/16 processor with 64K bytes of memory, a 10M-byte disk system, a 400 card/min card reader, a 60- to 200 line/min printer, a Carousel 30 terminal and the OS/16 MT operating system. Ipac/16 costs $33,500.

Ipac/32 includes the Model 7/32 processor with 128K bytes of memory and the same peripherals and software as Ipac/16. It costs $43,500.

The package price includes installation and a 90-day warranty, the firm said from 2 Crescent Place, Oceanport, N.J. 07757.

For Small Business Users

DEC Adds Word Processing to 310 CPU

By Esther Surden
Of the CW Staff

MAYNARD, Mass. – The Digital Equipment Corp. Datasystem 310W introduced here recently adds word-processing capabilities to the firm's Datasystem 310, a DEC spokesman said.

The 310 was designed for small business users and Fortune 500 companies with branch offices that must communicate to a remote host mainframe at headquarters.

The 310 hybrid system allows users to perform applications such as order entry, inventory control, sales analysis and payroll and word-processing applications that include the preparation of general correspondence, form letters and standard reports.

DEC Datasystem 310 models already in the field can be upgraded to the 310W by adding a CRT, keyboard and printer with interface and by obtaining the software, a spokesman said.

The system, based on a PDP-8/A, includes a VT52 CRT with upper- and lower-case characters, full typewriter keyboard and a special keypad for text-editing functions, DEC said.

The turnkey software for the system is contained on part of one of two floppy disks with 335K bytes each that comprise the mass storage for the system. A Diablo Hytype II printer operates at 45 char./sec and is of "letter quality," DEC said.

Optional Communications

An optional asynchronous Ascii communications package allows the 310W to communicate with any conversational time-sharing system or directly with other 310Ws, a spokesman said.

Under the communications software, the user can configure the system to communicate with the host via the keyboard and screen or directly from the disk. The host system can send information to the system's CRT, printer or disk.

The system with 32K bytes of memory, CRT, keyboard, printer, dual floppy disks and software costs $22,600. The communications package, not including a modem or acoustic coupler, costs an additional $1,500, and users in the field can upgrade their 310s for $10,600, the DEC spokesman said.

The 310W operates via a series of "cue-card" prompting commands and is said to have the touch and operate in the same manner as a standard office typewriter. All typing is done on the bottom line of the CRT screen.

Over 100 full pages of text with 2,500 char./page and 50 pages of user-defined material such as a shorthand library of commonly used terms or expressions can be stored on the floppy disks. Files are of random length.

The unit facilitates the preparation and editing of reports that may require several drafts before the final printing, the creation of documents from a library of stored paragraphs and the printing of form letters from stored documents with addresses supplied from the mailing list which is also stored.

The system is comparable to Vydec, Inc., 3M-Linolex Systems, Inc., and Lexitron Corp. word processing systems, which use CRTs, but do not feature the DEC system's video scrolling techniques and are not also small business computers, a DEC spokesman said.

First deliveries are scheduled for April. Volume users will be handled directly through DEC, while smaller orders will be sold through OEM system houses, a spokesman said.

DEC plans to offer word processing throughout its product line and introduce some unique systems not based on previously introduced DEC products in the future, a spokesman said. Dates for future product releases are not available, he added.

DEC Datasystem 310W

User Replaces T/S With Mini, Claims $100,000/Year Savings

By Esther Surden
Of the CW Staff

HARTFORD, Conn. – An insurance company here estimated it is saving about $100,000 a year by replacing a time-sharing service with an in-house minicomputer.

The figure was arrived at by taking the same rates that would have been charged by the time-sharing vendor and applying them to the work done on the firm's Hewlett-Packard 3000 and does not include other developmental factors, according to Jerry Schwartz, systems manager at Hartford Insurance Group.

Prior to the installation of the HP 3000, the firm had been using two time-sharing vendors for management decision applications. One example of such an application would be pension actuary "what iffing" for a corporate customer the cost effect on his pension plan if the full vesting period was dropped from 20 years to 10.

One of the time-sharing vendors has been completely replaced by the mini, Schwartz said.

Hartford has a large DP installation of four IBM 370s, but these machines were not equipped to handle computational users, Schwartz said.

The installation is oriented towards production work in Cobol. The 3000 runs in Basic and Fortran and provides fast access to a computational-oriented system.

The 3000 has not replaced the second time-sharing service, Schwartz said. The service has a national network, and a great deal of software development effort has gone into it. The firm is reluctant to change from this service at present, he added.

The configuration, accessed by about 20 different departments in the company, includes an HP 3000 with 128K bytes of core memory, two 1,600 bit/in. tape drives, one moving-head disk and one fixed-head disk, a 200 line/min printer and a card reader.

The configuration supports 10 dial-up lines and cost the firm about $200,000. Two batch jobs and 10 terminal sessions can run concurrently on the system, Schwartz added.

Considered Alternatives

Before deciding to purchase the 2000, the firm looked at several systems. The Burroughs Corp. 5500 was considered and dismissed because it was too large for the company's needs as was the Digital Equipment Corp. Decsystem-10.

Data General Corp. minis were also considered, but at the time had insufficient software support for the firm's needs, Schwartz said.

The HP 3000 is used for many different applications. In the pension department, the mini helps calculate funding for both group and individual pension plans.

Just to project for one employee at any age until retirement the benefits he may collect, the probability of collecting them and discounting those benefits to arrive at a present value could take as many as 1,000 steps, according to a company

(Continued on Page 30)

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Mini Keeps Track of Electronics Parts for Company

By Esther Surden
Of the CW Staff

EDGEWATER, N.J. – When a manufacturer of miniature light sources reached the practical growth limits of a manual materials and production control system, the firm here turned to a minicomputer.

The firm has an inventory list that can run into the millions, Bernard Schnoll, president of Industrial Devices, Inc., said.

The system allows the firm to keep track of what parts are needed and when they are needed. The system controls the material support production activity, Schnoll said.

Prior to getting the system designed by STC Systems, Inc., a foreman would make an estimate of the number of molded parts needed. An oversupply of the items would frequently result, which could last for several years, Schnoll said.

The firm decided to go with a turnkey vendor after considering alternatives, including service bureaus and hardware vendors that would supply no software and those that would supply both.

"We simply went with the vendor we thought could do the best job," Schnoll said.

The firm took us to three or four installations where we could talk to the people about the problems, if any, they were having with the system, Schnoll said.

One vendor was eliminated from the

In-House Mini Saves Firm $100,000/Year

(Continued from Page 29)

spokesman.

The in-house system allows these computations to be made quickly, he added.

"If a municipal client wants to know the effect on pension costs of adding a generous disability benefit to its plan for policemen and firemen, we can respond precisely and quickly, not simply with educated guesses," Paul Gewirtz, associate actuary in the firm's pension department, said.

In the property and casualty actuarial department, the minicomputer is used to make rate level evaluations and filings with various state insurance authorities. Printouts formerly required a half hour on a terminal hooked to an outside time-sharing service.

The line printer with the system now takes two minutes to print out, a spokesman for that department said.

Hartford's group department still uses outside time-sharing services, but has transferred many applications to the HP 3000.

Computing a rate for a group policy involves inputting many variables: life insurance amounts; whether disability insurance is involved and, if so, many short and/or long term considerations; and numerous parameters surrounding accident and health options, such as number of days of hospital coverage, major medical and surgical protection, etc.

Other factors that must be considered for a group policy are the census of the group: their ages, sex and salary ranges.

Sex, especially, has a heavy impact on rates. Females more than 50 years of age have a downward impact on rates, with their hysterectomy and child-bearing days mostly behind them.

Males, in contrast, have the opposite effect when over 50, because they enter their heart-attack and ulcer-prone years.

Some of the life claim systems are being run on the in-house mini as well. The company must keep track of actual death dates of policy holders and the date reported by claimants. Based upon the reporting lag, the company then establishes reserves for claims and interest due from the actual date of death, as required by some states.

field even though his bid was low because the firm had no systems in the New Jersey area, he added.

Two of the reports generated by the system are a weekly material requirements report and the weekly open-order report.

The material report lists each raw material, both molded and purchased, and when this item is needed for production. The order report lists orders by scheduled date, highlighting past-due orders.

Orders that cannot be sent to production are listed on a printout, Schnoll said. Previously the firm could not tell what was holding up an order, he added.

The system scans orders each week based on their scheduling dates. Prior to the orders' release for production, wire-cutting tickets are printed and forwarded to the wire-cutting department.

Production work orders for available parts are included on a consolidated list of production orders to be released. The list and work orders are forwarded to the stockroom as a material requisition.

When the customer's order is assembled and shipped, a previously prepared shipping document is annotated and returned to the system operator. The actual quantity shipped and freight information is entered.

After the actual shipment is recorded, invoices are generated and items are posted to the customer's record. Sales commissions are also posted to the salesman's records.

Training Personnel

One operator was hired to run the system, Schnoll said, but the main part of the work was in training the people who interfaced with the system to get them used to new forms and methods of operations.

He estimated it took the firm close to a year to get the system running smoothly. Schnoll played a large part in helping the employees adapt, he said.

The system with a 65K-byte Data General Corp. Nova 1200 CPU, an Iomec, Inc. disk drive and a serial printer cost the firm $60,000 when they purchased it three years ago.

The system has since been upgraded to add another disk drive for a total of 10M characters of storage and a 300 line/min printer. The total system cost is about $85,000, Schnoll said.

"But you don't expect to see the benefits in how much we've saved" over other systems, Schnoll said. "Yes we saved three clerks immediately," but the benefits are in control and company growth, he said.

"We had reached our practical limits and would have had to do something, and costs would have been just about the same no matter which way we went."

Here are some of the companies we'll be keeping at CompDesign 76.

CONTROL LOGIC

Control Logic will feature the MM1, a line of general-purpose OEM microcomputers for use in control and other applications stressing cost effectiveness, versatility and speedy market entry. Fully software supported, MM1 offers I/O device simulation capability through the keyboard. Microcomputer seminar.

DATA 100 CORPORATION

OEM MANUFACTURERS

The DATA 100 OEM product line features line printers ranging in speed from 62.5 to 600 lines per minute, front and top loading disk drives, card readers, card punches, paper tape products, magnetic tape products, and a line of general purpose microprogrammed minicomputers and accessories.

INFOREX

Inforex 180 Magnetic Line Printer. A full 180 LPM printer.

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GENERAL INSTRUMENT

Rotating memory products will show its new head per track disk memory – The Model 700 – a compact, low-cost, light-weight, fast access memory that's designed for ultra reliable operation in point of sale, communication, process control and key-entry applications.

INFORMER, INC.

INFORMER, INC. has pioneered compact, attractive, lightweight computer display terminals. Unlike other display terminals available on the market, which are based upon the 80-column Hollerith punched card, INFORMER terminals are designed for maximum readability, using typical newspaper column widths of 32 characters.

CENTRONICS data computer corp.

Centronics Data Computer Corp. will display a full range of printer products with speeds of 88 cps to 200 lpm. Included will be new teleprinter models, label printers and ledger card devices. These products are designed to help our customers meet the increasing demand of new markets.

TALLY CORPORATION

Tally will exhibit its line of medium speed, low cost, dot matrix impact printers for minicomputers, business systems and communications applications. Included are 120 character per second serial printers and 125, 200 lines per minute printers. The primary attributes of the Tally printers are high fidelity print quality and hi reliability performance.

TELETYPE

Teletype Corporation's exhibit features its new, 300 lpm, tractor feed impact printers- offering exceptional flexibility and reliability at an impressively low price. The highly successful (600,000 plus sold) very economical model 33 ASR will also be shown.

Time Lag Too Great With Batch

Auto Parts Distributor Saves $9,000/Mo With Mini

PITTSBURGH, Pa. – An auto parts distributor here said he has saved about $9,000/mo in increased productivity and reduced personnel costs since purchasing his minicomputer system in 1973.

The user, Gary Davis, president of Napa Pittsburgh, said the firm used a Honeywell 200 batch processor with cards before installing a Digital Equipment Corp. Datasystem 500.

A three-day lag developed in record-keeping with the batch method; on a Thursday the firm was still depending on Monday's figures. Inventory could only be estimated within 10%, he recalled.

The company considered upgrading to a larger Honeywell system, but rejected the idea because DEC's price-performance ratio seemed better.

The system consists of a PDP-11/45 CPU, 90M characters of fixed and removable disk storage, CRT and teletypewriter input terminals, a 1,200 line/min printer, a 60 line/min matrix printer and magnetic tape storage. On-line since July 1974, the system cost the firm about $300,000.

Serves 75 Jobbers

The company services 75 wholesale jobbers within 150 miles of Pittsburgh and the firm's distribution center in Altoona, Pa.

Pittsburgh has installed terminals in jobbers' offices, tying them with the warehouse and distribution center by remote teleprinter.

One jobber told the firm, "If I can save one or two sales on a Saturday by telling a customer the carburetor or clutch assembly he needs is in the warehouse and available on Monday, then he can't do better with anyone else," Davis said.

Telephone orders are directly entered into the system via the video display terminals and mail orders are recorded on magnetic tape and fed to the system.

The system also produces invoices and picking tickets. The handwritten form previously used was often illegible, Davis said.

Back ordering is also taken care of by the system. Previously, inventory received one day was sold out a short time later without the company's knowledge.

Now, when a jobber asks for a part that is out of stock, the order goes into the pending file. As soon as the requested part arrives in Pittsburgh, the system checks packing slips against the pending file. The picking ticket is then printed, with back orders filled on a first-come, first-served basis.

Customers also get invoices along with the order, in contrast to the several days' lag that once existed. Payments can be made quickly, improving Pittsburgh's cash flow, the firm said.

One person with experience on the system was hired to run the data center. Other personnel were trained from existing staff members to work with the machine, Davis said.

Will you be there when CompDesign comes to a city near you?

WANG
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Wang will display for OEMs a fast, quiet, reliable 200 cps printer. With a standard 96 character set formed by a 9 x 9 matrix, up to 132 print positions.
A price competitors can't match, and a 100 city field support staff.

System Industries

We've delivered over 2,000 disk storage systems to mini computer users throughout the world - for a lot of good reasons. System Industries represents your only viable alternative to the mini computer manufacturer when it comes to purchasing disk systems. For details about storage capacities (up to 1 billion bytes), access time, and our powerful software routines, see us at the CompDesign show.

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The Other Computer Company:
Honeywell

Honeywell will demonstrate a minicomputer especially suited to the OEM manufacturer and systems builder. The powerful system architecture combines compactness, advanced modularity, built-in test and verification, and exceptional reliability and serviceability. Software, peripherals, communications capability, and an attractive price structure round out an offering that has benefitted from over ten years of extensive minicomputer experience.

EMM
ELECTRONIC MEMORIES & MAGNETICS CORPORATION

EMM will be introducing its new SYSTEM 80, a high-performance, 8080-compatible. complete micro-computer system. Outstanding features include speeds up to four times faster than typical 8080 systems, choice of both core and semiconductor memory, and extended addressing up to 1 megabyte. A full line of minicomputer add-in/add-on memory and several standard core semiconductor memories will also be on display.

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CSP Processors Run Under Mini Control

BURLINGTON, Mass. – The V series of floating-point array processors from CSP, Inc. operates under minicomputer control and was designed for increased computer productivity where repetitive signal-processing operations are involved, the vendor said.

The processors in the series are Assembly language programmable. The systems feature program modularization, unique addressing and binding procedures and one-word instructions, the company said.

The floating-point processors "are most effective in applications where highly repetitive computational operations are performed on data," CSP said. Suggested applications include seismic exploration, geophysical research, speech analysis, acoustics, noise analysis and nuclear physics.

The processors can be programmed to sequentially perform any number of functions, CSP said.

The V series uses a 32-bit hexadecimal floating-point format. Memories are either bipolar with a 125 nsec cycle time or MOS with a 500 nsec cycle time, according to the firm.

Memory is field-expandable and can be increased to 756K bytes, the firm said.

Prices start at $9,500 for the processor and interface without memory. Memory is available in 4K, 8K or 16K increments and costs from $2,400 to $9,300, a spokesman said from 209 Middlesex Tnpk., Burlington, Mass. 01803.

SPR Graphics System Uses Eclipse or Nova

HIGHLAND PARK, N.J. – The Spar/Graphics interactive graphics system from Scientific Process and Research, Inc. (SPR) incorporates a Data General Corp. (DG) minicomputer.

The system, which uses either an Eclipse or Nova mini, is said to allow figures to be displayed in a 1K by 1K addressable matrix on a 21-in. screen.

The system includes a processor, the 21-in. graphics display and a CRT terminal.

Figures can be enlarged or reduced by a single command, moved on the screen, duplicated, appended and stored on disk to be recalled at any time, SPR said.

Both two- and three-dimensional images can be handled and shown in motion.

Plotters for the system are optional. System applications include creating drawings of electrical schematics, instrumentation loop diagrams, building equipment, material schedules, logic diagrams and equipment arrangement, the company said.

Any DG computer can be modified into a Spar/Graphics system, SPR said. The system costs $5,000 plus the minicomputer.

A fully equipped system can be leased for $1,000/mo from the firm at 24 N. Third Ave., Highland Park, N.J. 08904.

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We've selected leading experts from around the country to guide each of our Seminars. They are highly accomplished specialists in their fields, experienced in presenting their techniques to industry and management. If you're involved in one of the areas shown, you should attend the EDP Seminar Series this fall. What you learn will benefit your company, your installation, and you.

Performance Evaluation and Improvement

Saul Stimler, author of *Data Processing Systems: Their performance, evaluation, measurement, and improvement* will lead this two-day seminar on measurement techniques designed to save your installation money. As well as system performance at your own installation, topics covered include: Criteria for quantifying performance, pencil and paper analysis of a system, Benchmarking techniques, Realtime, Batch and interactive time sharing systems.

Cost for the seminar, including continental breakfasts and luncheons and all course materials is $250.

New York	Hilton	May 10-11
Chicago	Hyatt Regency O'Hare	May 17-18
Wash., D.C.	Stouffer's National Center Inn	May 24-27

Data Communications Course #1010 – Practical Data Communications Systems & Concepts

Dr. Dixon Doll, the nationally recognized teleprocessing consultant will lead this two-day seminar on the newest advances in data communications. The course covers areas like SDLC, HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of Satellite Carriers.

Total Cost, including workbook, reference materials luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for the reduced rate of $300.

Chicago	Hyatt Regency O'Hare	Mar. 15-16

Data Communications Course #1020 – Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow-up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three-day seminar covers procedures, approaches, and algorithms for evaluating and cost-optimizing network operations. Total cost, including an extensive set of customized course materials, is $450. Additional registrants from the same company qualify for a reduced rate of $400.

Write for Spring Schedule.

Legal Tools for Computer Contracting and Protection

Under the instruction of Roy N. Freed, a nationally known lawyer, author and educator in the field of computer law, you'll learn how to increase your advantage in dealing with vendors that supply your installation. As well as practical discussion and review of your own contracts, subject areas covered in this 2½-day seminar include: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, and Techniques for handling any transaction. Cost for the entire seminar, including continental breakfasts, luncheons and all course materials is $325. Additional registrants from the same company are charged only $275.

Chicago	Hyatt Regency O'Hare	May 5-7
Seattle	Airport Hilton	May 19-21
New York	Summit Hotel	Jun. 23-25

How to Increase Programming Productivity

John W. Brackett, PhD, Vice President of SofTech, Inc., will lead this two-day seminar for technical managers on the state of the art of Software Engineering. Under his direction you will learn how to: create more precise and visible analysis and design; reduce integration problems; improve software reliability; incorporate visible outputs into the software development cycle; increase programmer productivity; and improve programming management methods. Topics covered include: Structured programming; Top-down analysis, design, implementation; and Chief Programmer teams. Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials is $300. Additional registrants from the same company are charged only $250.

Chicago	Hyatt Regency O'Hare	March 8-9
Wash., D.C.	Stouffer's National Center Inn	April 26-27
Atlanta	Hyatt Regency	May 3-4
St. Louis	Mariott at Lambert	May 24-25

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COMPUTER INDUSTRY

CI Notes

British Show Set for March

LONDON – Present and potential computer equipment users in Scotland and Great Britain will have a chance to share their problems and solutions with representatives of equipment manufacturers, software houses and service bureaus at Computermarket '76.

This year's show will open in Edinburgh, Scotland, March 9-11. It will move on to Manchester, England, March 16-18 and London March 23-25.

The exhibits this year will feature small business systems, minicomputers, add-on memories, key-to-disk equipment, printers and terminals, as well as software packages, according to Mike Young, managing director.

The list of exhibitors includes Redifon; Interdata, Inc.; Modular Computer Corp.; Prime Computer Corp.; Ferranti; Scottish Computer Services; and Texas Instruments.

Altergo, G.E.C. Computers, Digico, Datasaab and Centronics Data Computer Corp. will also be exhibiting.

In conjunction with the Computermarket '76 show, there will be a series of one-day seminars, sponsored by Online Conferences, Ltd. as well as a special session in Edinburgh on the practical implications of the Employment Protection Act for Data Processing.

Electro Exhibit Space Sold Out

BOSTON – Exhibit space at the first annual Electro conference and exhibit is sold out, according to show organizers.

Electro/76 represents a merger of two annual events, IEEE Intercon, previously in New York, and North East Regional Electronics Meeting (Nerem) in Boston.

Electro shows will be presented in Boston and New York in alternate years, starting May 11-14 in the Hynes Memorial Auditorium and the Sheraton-Boston Hotel here.

About 255 exhibitors have signed for the 508 spaces.

There will be exhibits from the USSR, Israel, Quebec, Canada, the UK and Japan, organizers said.

The Electro show are sponsored by two units of the Institute of Electrical and Electronics Engineers (IEEE) and the New England and New York chapters of the Electronic Representatives Association.

Supershorts

TRW Data Systems has opened an office in Edmonton, Alberta, Canada.

– – –

Program Products, Inc. has licensed firms to market its Data Analyzer and Audit Analyzer in Scandinavia and Japan.

In Next Five Years

CRT Shipments to Grow 5.6% Annually

By Toni Wiseman
Of the CW Staff

WELLESLEY, Mass. – CRT terminal shipments, which were valued at $402.7 million in 1974, are projected to grow at a 5.6% per year rate to $557.4 million in 1980, according to a recent report by Venture Development Corp. (VDC), a market research firm here.

Unit shipments will grow twice as fast – from 119,000 units in 1974 to 221,000 units in 1980, the report added.

Of all the alternatives to CRT display, only gas-panel technology stands a chance of increasing its share of the alphanumeric terminal market, according to VDC. CRTs, it predicted, will remain the dominant technology throughout 1980.

At the beginning of 1975, there was an installed base of 418,000 CRT terminals, worth $1.45 billion.

In terms of units, 98.5% of this installed base was accounted for by alphanumeric terminals and the remainder by graphic terminals. In terms of dollars, graphic terminals accounted for 7.4% of the installed base, VDC said.

The business opportunities in the CRT terminal industry are centered around microprocessor-based terminals, which will provide some protection from technical obsolescence to both users and manufacturers, the report stated.

At the beginning of 1975, 9% of CRT terminal installations were microprocessor-based while 24% of 1974 shipments were microprocessor-based, VDC said. By 1980, that figure will grow to 60% of shipments.

In 1980, it predicted, the installed base of CRT terminals will be 46% microprocessor-based, up from 9% in 1975; 1% minicomputer-based, down from 4%; and 53% non-microprocessor-based, down from 87%.

"The nature and timing of the next generation of IBM CRT terminals to replace the IBM 3270 will be the next major milestone for the CRT terminal industry," the report said. "We believe the IBM '4280' is likely to be introduced in mid-1978 and will be microprocessor-based."

IBM dominates the alphanumeric CRT industry, according to VDC, with greater than a 15% share of the IBM 2260-compatible market and over 75% of the IBM 3270-compatible market.

Other major factors in the market are Teletype Corp., Bunker-Ramo Corp., Sanders Associates, Univac, Hazeltine, ADDS, Incoterm, Sycor, Inc. and Digital Equipment Corp.

"The policies of AT&T concerning price, quality and availability of data communication channels will have a direct bearing on the growth of CRT markets," the report said.

Other Factors

Apart from AT&T's policies and the uncertainties concerning the timing and nature of the next generation of IBM CRT terminals, the market will be influenced by computer and minicomputer shipments, time-sharing volume and data communications line usage, as well as CRT terminal price trends, the report stated.

Computer shipments, for instance, will increase at an 8.5% annual rate from 1975 to 1980, and over 40% of the CRT terminals shipped can be traced to a system including a computer mainframe, the report forecast.

By 1980, 50% of the installed base of CRT terminals will be used in remote applications and 43% in local applications, the report predicted. At the same time, 53% will be stand-alone terminals and 47% will be used in clustered applications.

The majority of CRT users are in the manufacturing field (27%), followed by financial (17%), government (15%), scientific (10%), transportation (12%) and education (7%).

Educational, medical and retailing user segments offer the greatest potential for growth in the next five years, the report said, even though they currently have a cumulative market share of only 15%.

By the end of 1974, the average CRT terminal user had installed slightly over 21 terminals, with users falling in two classes, low-volume users (1 to 14 terminals) and moderate to high-volume users (over 14 terminals).

"The average size of terminal installations is presently in a declining trend, which can be attributed to both time-sharing applications and first-time mini/small computer applications that are low-volume CRT terminal users," VDC said.

Based on indexes developed by VDC for forecasting CRT price trends, the report predicted the average price of an alphanumeric CRT terminal will decline from $3,400 in 1974 to $2,500 in 1980, a factor which will affect market penetration in certain segments as well as influencing the growth of the replacement market for IBM 2260, IBM 3270 and teleprinter terminals.

Growth Rate of 40% Predicted For Specialized Terminal Mart

WALTHAM, Mass. – "While the overall growth rate for general-purpose terminals is expected to be some 15% per year for the next five years, growth in specialized application-unique devices is expected to grow at a compound rate close to 40% per year," according to a study by International Data Corp. (IDC), a market research firm here.

"Much of this growth will be at the expense of the general-purpose market and will undoubtedly come from products as yet unannounced or at best just emerging," the report added.

There were an estimated 437,000 application-oriented or industry-specialized terminals installed in the U.S. at the end of 1975, IDC said.

By the end of 1980, there will be about 2.3 million of these terminals, raising the installed value from the current $1.8 billion to $10 billion, the study predicted.

Similar Characteristics

The terminals, dubbed "autotransaction" hardware by IDC, all have similar characteristics.

They are computer related, are elements of other DP industry segments, are designed to meet the needs of one specific industry/application and assist in the input or output of transactions to or from a data base or perform the entire function including updating.

In addition, the products are intended to be marketed to more than one customer.

Passbook teller terminals accounted for 31% of the total $1.8 million market in 1975; by 1980, their share will have dropped to 8.3%.

General merchandise point-of-sale (POS) terminals will also drop from their current 27.1% to 18.5%, while supermarket POS will show the largest growth from 6% to 31.4%.

Other segments of the market include stock quotation, electronic funds transfer, factory data collection, credit authorization, cash dispensers, commercial tellers and portable data entry.

At year-end 1975, IBM had the largest market share for these specialized terminals, but that share amounted to only 18%. NCR followed closely with 16% and Singer had 13%.

Burroughs Corp. and Bunker-Ramo Corp. each claimed 10%, while TRW Systems, Inc. GTE, General Instrument Corp., Docutel Corp. and MSI Data Corp. combined accounted for 20%.

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Reception to Carousel Terminal Surprises Interdata

By Molly Upton
Of the CW Staff

OCEANPORT, N.J. – Reception to Interdata, Inc.'s Carousel 300 printer terminal has been somewhat of a surprise to product planners at Interdata, according to James R. Folts, general manager of the terminal products business unit.

When the firm brought out the 30 char./sec character printer, it thought most of the demand would be for the printer mechanism itself.

Nevertheless, it offered the unit as a completed terminal for $2,695, figuring this would be one way to get the product into use quickly, Folts said.

However, the order rate is running nine to one in favor of completed units, and nearly all are being shipped as terminals, he said.

This is indicative of the change in the nature of the character printer business, Folts observed, which started when Diablo sold only its printer mechanism on an OEM basis.

But with Interdata's price below $3,000, the margin for others to buy mechanisms and turn out terminals has declined considerably, he added.

Diablo then came out with its Hyterm terminal which it sells for $3,335 for one terminal or $2,665 in OEM quantities, he remarked.

An increasing number of terminal manufacturers are turning to distributors to reach the customers their direct sales forces don't reach, Folts said.

Interdata is doing this and recently signed a $1.5 million national distribution contract with International Computer Equipment. Distributors generally handle the smaller orders from customers while most of the orders to Interdata are for 50 units or more, Folts said.

Shipments of the Carousel started in August and Folts estimated between 300 and 400 units are installed. Order backlog is over 1,000 units, he added.

Interdata expects production to be up to 200 unit/mo shortly, he said.

Carousel customers tend to be time-sharing firms, distributors or end users, particularly those in the financial community, he said.

The Carousel fits well into the financial community because it gives good print quality, which is important to people wondering where the decimal mark is, he said.

Also, because it is a character printer, its output is machine-readable whereas most matrix characters are not, he said.

In addition, the unit prints up to 12 carbons. This, he explained, was a by-product of the original design to give flexibility in handling front insert forms.

The Interdata printer was the first to use a microprocessor to directly control the print mechanism, he said.

Emphasizing CPE Suitability

Johnson Refocuses 'Jars' Marketing Effort

By a CW Staff Writer

McLEAN, Va. – Johnson Systems, Inc. has begun emphasizing the suitability of its Job Accounting Report System (Jars) for computer performance evaluation (CPE) because a survey of its users indicated one-third uses it primarily for that purpose, according to Bob McIntosh, vice-president of marketing.

Jars, which incorporates a report writer in conjunction with retrieving IBM System Measurement Feature (SMF) data, can typically perform half of what a user does with a CPE system, he said.

Originally the firm marketed Jars exclusively as a job accounting tool. A year ago Johnson didn't even use the words "performance evaluation," McIntosh said, but that changed after the survey.

About one-quarter of Johnson's ads are oriented toward the CPE concept, he said, and draw good results.

During 1975 Johnson doubled its revenues and earnings more than doubled. Revenues have doubled in each of the past two years, McIntosh said.

Johnson's revenues in 1976 should be twice those of 1975 "if we only do a reasonably good job marketing what we have," he added.

The firm plans to introduce a product called Minimizer, a Cobol source code optimizer system. It bought the product from Computer Services Corp. and has repackaged and simplified it, McIntosh said.

McIntosh doubts the price of $5,000 for Jars will increase much. Happy customers will be more inclined to buy other products, he explained.

McIntosh expects users to increase their budgets for proprietary software between 30% and 50% this year. He also has "a gut feeling" the increase in dollars available for CPE tools is higher than for application packages, he said.

There should be twice as much spent on performance evaluation hardware and software as last year, he said, attributing this growth partially to the increasing simplification of the tools.

Five years ago it took a super expert to use performance evaluation tools, he said. "If tools are complex, people aren't going to use them."

Jars fits on IBM 370/125 models and up and 360/50s and up. Most of the base is 370 users, with the biggest industry group being banks.

Computer utilities, including service bureaus and time-sharing firms, rank second, and general manufacturing is probably third, McIntosh said.

Johnson has over 500 clients, but little idea how many installations, he said, since it charges full price for the first copy to a company, half price for up to seven copies and then allows the customer unlimited use of the package.

Jars was designed to be used with a minimum of training and background and requires no on-site support, he explained. A salesman can demonstrate Jars on-site, he added.

McIntosh said he is aiming at about half of the installed base of IBM machines that can use Jars. He estimates Jars is currently used on about 10% of these sites.

'Super Flexible' Plans

Johnson is "super flexible" in its sales, lease and lease/purchase agreements, McIntosh said. Over 95% of its packages have been purchased, and the firm is thinking about a 15-month lease/purchase plan similar to that offered by IBM on its gear.

Johnson has no plans to make the equivalent product for other makes of machines, he said.

McIntosh sees little demand now for performance evaluation gear on minicomputers. Those users doing dedicated applications tend to be very specialized and tuning is generally done in-house, he said.

In other instances, it is almost a trade-off whether to get another CPU, he said, since hardware is so inexpensive.

Johnson, now five years old, installed its first DOS system in late 1972 and OS in 1973.

Last year it started marketing in Europe through representatives in Sweden, England, France, Germany and Australia.

Board Gets Plan For Stock Market

NEW YORK – Merrill Lynch Pierce Fenner & Smith, Inc. recently submitted a proposal for a largely computerized national stock market to the National Market Advisory Board.

The system would be used to help stockbrokers' customers determine which exchange was currently marketing desired stock at the best price.

The proposal is now being studied by the board, set up by the Securities Exchange Commission (SEC) under a mandate from the U.S. Congress to examine the feasibility of such a system.

Hardware needed to handle a national market system is already being used to process odd lots of less than 100 shares away from the New York Stock Exchange floor [CW, Feb. 2], a Merrill Lynch spokesman said. However, new programs would have to be written.

"It is not a lack of capability or know-how which is holding us back," the spokesman said. "It is rather politics, in the sense of getting people to act," which is causing the delay.

Merrill Lynch expects a pilot project to be under way in about a year, the spokesman added.

Commerce Finds Argentinean Mart Has Great Potential for Growth

WASHINGTON, D.C. – The Argentinean market for DP equipment and related gear has a great growth potential, according to a U.S. Department of Commerce report.

Although investment in DP equipment has been hampered by the economic and political instability that has prevailed in the country for the past few years, Argentinean imports of computers and peripherals during 1973 totaled $19.9 million, of which the U.S. supplied 39% or $7.8 million, according to the report.

In terms of relative importance, the report said, imports of computers, peripherals and parts accounted for more than 50% of total Argentinean imports of business machines during 1973 and about 44% during the first half of 1974, the latest statistics available.

The U.S. is Argentina's principal supplier of computers and related equipment, followed by Italy and West Germany, but Argentinean DP imports have dropped sharply from 1972 to 1974.

In the broader business machines category, Argentinean imports from the U.S. in 1972 were $7 million and rose to $8.3 in 1973.

The first six months of 1973 accounted for $5.2 million of that figure, while total imports from the U.S. for the first six months of 1974 were down to $2.7 million.

Total business equipment imports dropped from $16 million to $15.5 million in the same six months of 1974.

Carroll Quits Sanders, Replaced by Haladej

NASHUA, N.H. – Arthur W. Carroll, group vice-president and general manager of Sanders Associates, Inc.'s Data Systems Group, has resigned.

He has been succeeded by M. Andrew Haladej, formerly vice-president of business development for the group.

Neal Dempsey, formerly Western regional manager, was named to the previously vacant post of sales manager.

Lloyd Gainey, manager of field operations, also resigned. He has been replaced by Robert McKeon, whose title is manager of field engineering.

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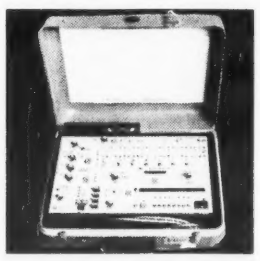

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Demand Doesn't Surprise Firm

Diablo Hytype II-Based Terminal Orders on Schedule

By Molly Upton
Of the CW Staff

HAYWARD, Calif. – Orders are on schedule for Diablo Systems, Inc.'s Hyterm terminal, according to Charles Kotsaftis, manager of product marketing.

The unit is based around Diablo's Hytype II printer and includes a keyboard and RS-232 interface for $2,665 in OEM quantities.

The demand for the Hyterm is very good, which is not surprising to Diablo since customers had been asking for an inexpensive terminal unit, Kotsaftis said.

Although Diablo offered a terminal previously, it was not priced attractively for OEMs. It sold for about $5,000 and most of production went to Diablo's parent firm, Xerox, he said.

Orders are running about 70% for Hytype II mechanisms and 30% for Hyterms, and Kotsaftis estimated this will continue to be the pattern in the future.

The actual pricing of the Hytype I and II are the same, he said, but with the advantages of the Hytype II, the firm can sell the Hyterm for less than its original terminal unit, which was based on the Hytype I.

One of the principal reasons for the cost reduction between the $5,000 terminal unit and the Hyterm is that the Hytype II machanism allows for more equipment, such as an internal power supply and RS-232 interface, to be placed inside the enclosure, he said.

Offering both the terminal unit, the Hyterm, and the printer mechanism, the Hytype II, does not present a conflict for Diablo's OEM customers, Kotsaftis explained, because the OEMs have the choice of buying the complete terminal or selecting parts to complement the printer mechanism.

Hyterm sales haven't impacted Diablo's existing customers, he said. Although there will be some overlap, the overall effect will be an enlarged market for all, he predicted.

By increasing the market, the firm stands a better chance of reducing production costs and thus decreasing the price of the unit, he said.

There is a three- or four-month backlog of orders for the Hyterm, he added.

The firm is working on increasing the production of the printer mechanisms, since most of this output has been committed to Diablo's OEM customers in the form of Hytype II printers, he said.

Although there is an emotional issue about the OEM supplier being in the same market as that of the OEM customer, Kotsaftis said, when it comes down to the real crux, the dollar does the talking. OEMs feel with the price of the Hytpe II, around $1,335 in single quantities, they can compete with Diablo's Hyterm unit, he said.

Company Forms Group to Sell Excess DP Time

SYRACUSE, New York – Carrier Corp., a room-heating and air-conditioning manufacturer here, has formed a group, Carrier Computer Services (CCS), to market its excess computer time.

The firm has been selling time unofficially for three or four years to outside firms, according to Alvin A. Calderon, national sales manager for computer services.

Last October, management announced its commitment to establish a separate group to offer excess capacity on its IBM 370/168 to firms in the Syracuse and central New York area. A budget of $200,000 was allocated to the group.

"It was a matter of convincing [management] we could do it," Calderon said.

"We performed market studies and found there is a great demand in the area for time on a large-scale system such as ours," he said.

CCS handles the work of 19 Carrier plants in the U.S. and Canada. The work from outside firms is only a small percentage of the total workload at the present time, Calderon said.

"Right now, Carrier is a $1 billion firm. We expect the present equipment to be adequate for our needs until we become a $2 billion firm. That leaves a lot of capacity," he added.

The 370 is running under VS2 Release 1.6 with Hasp 4.0. Software also includes IBM's Time Sharing Option (TSO), Customer Information Control System (CICS) and IMS.

In addition to both local and remote batch processing and time-sharing, CCS is offering consulting, programming and other technical support services.

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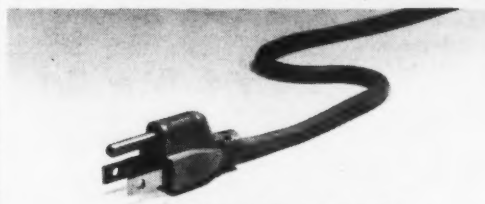
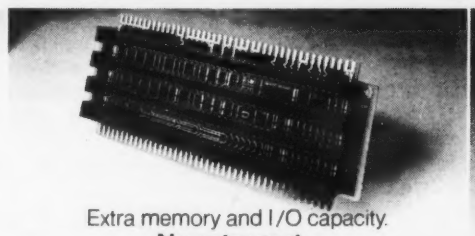
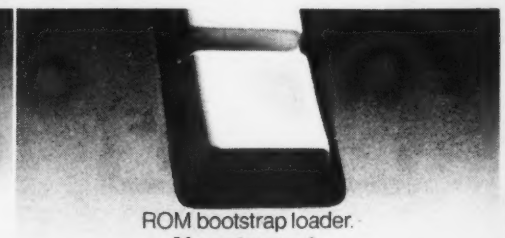


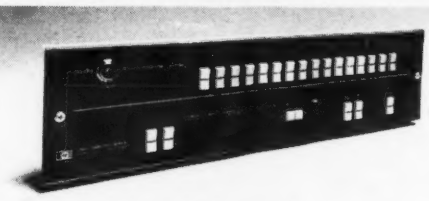
Brownout proof power supply.
No extra cost.



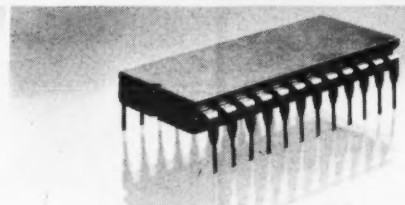
Extra memory and I/O capacity.
No extra cost.



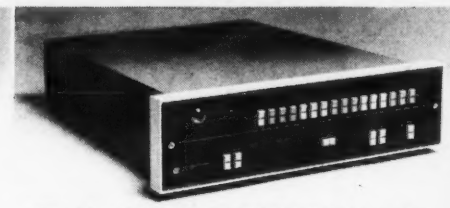
ROM bootstrap loader.
No extra cost.



Display panel.
No extra cost.



Parity, EAU, floating point.
No extra cost.



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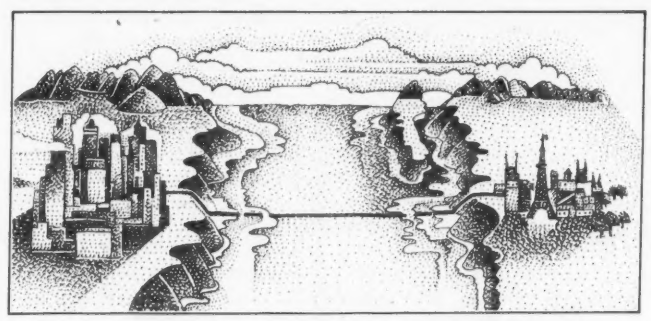

Canadian Marconi Company uses a minimum of 20 Hewlett-Packard 21MX minicomputers in each modular Telex switching system they build. These systems gather and switch Telex traffic for international transmission.

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Oil Firm's DP Offshoot Selling Time, Software Programs as Total Package

By Kathleen P. Quinn
Of the CW Staff

WAYNE, Pa. – Sun Computer Services (SCS), a subsidiary of Sun Oil Co., not only sells time on its computer to outside companies, but also offers a line of DP support services, an SCS spokeswoman said.

"Most firms in this business can't offer a total package, as we do," she added.

SCS has been selling time on its system for almost ten years "in a small way," but decided to go full-swing into the market after a restructuring two years ago when it became a subsidiary.

"We began by offering software programs in 1966," the spokeswoman said. SCS now offers about 40 commercial and scientific programs worldwide, she added.

SCS also offers personalized DP consulting services.

Plans Expansion

"Excess capacity on our computer, as well as the fact that several other companies are now selling time successfully, convinced us we should offer everything we have to outside firms," the spokeswoman said.

Right now, the market for the service is "big enough" to warrant the purchase of another computer. SCS is looking into buying another 370, she said.

Presently the SCS network is centered around one IBM 370/168 running under VS/Hasp.

Services, available on a 24-hour, seven day/week basis, include remote job entry and batch processing.

The majority of SCS customers are not petroleum firms. Many are small financial companies or manufacturing firms, she said.

Sun Oil accounts for about one-fifth of SCS' business, but this ratio is expected to decrease in the future.

COM, Other Output Media Sales Seen Doubling in Next Five Years

WALTHAM, Mass. – Computer output microfiche (COM) growth will more than double in the next five years, along with all output media, according to Joan Ross of International Data Corp. (IDC), a market research firm here.

Speaking at a recent meeting of the National Micrographics Association in New Orleans, Ross noted the large increase in paper prices, between 40% and 50% in the last two years, has resulted in greater interest in COM.

In contrast, COM film prices have gone up only 10% to 15%.

An IDC survey of 200 computer sites not currently using COM found 42% of the sites were either investigating its use or planning to implement a COM system in the near future.

Of the 45% of respondents who did not like COM, potential customers still emerged, Ross stated. Although 18% thought COM was too expensive, the price of COM systems is expected to drop while that of paper will continue to climb, she explained.

Another 11% said their current output was too small to warrant a COM system, Ross added.

A separate *EDP/Europa Report*, published by IDC, indicated COM is turning into a boom sector of the market throughout the world. Growth, it noted, will be larger in Europe than in the U.S.

While the U.S. market is expected to double in five years, the French market is expected to double within two years and then stabilize at a 25% annual growth rate until the end of the decade, according to the report.

Fifty percent of the COM market was in banking and insurance at year-end 1974, 5% in the public sector, 10% in the industrial sector and 35% in services, according to the report.

Worldwide EFTS Study Under Way

COLUMBUS, Ohio – A worldwide research program on electronic funds transfer systems (EFTS) is being conducted by Battelle Memorial Institute through its research laboratory in Frankfurt, Germany, with assistance from Battelle laboratories here and in Geneva, Switzerland.

A conference on payment systems, the first of several meetings and seminars forming part of the study, was held here recently.

Among the participants were representatives from banking associations, individual commercial banks, savings banks and savings bank associations, postal Giro (fund transfer) organizations, a computer manufacturer and an oil company.

Participants included the U.S., Germany, Sweden, Holland, France, Italy, the UK and Belgium. Japan and Denmark are also being covered by the study.

Membership in the program is still open, according to Dr. W. David Penniman, who directs the U.S. portion of the study. Retailers and consumer representatives will be brought into the program through a Delphi forecasting panel and special retail workshops, he said.

The study is using five different research techniques to obtain information about payment systems in each of the 10 countries, Penniman said, and to forecast the significant worldwide changes and trends in EFTS.

These techniques involve a Delphi study approach, the construction of a model for payments systems changes in each country and worldwide, and statistical data gathering and analysis from all countries.

Executive Corner

Stafford, Davy Get Basic/Four Promotions

A number of executive appointments have been made at Basic/Four Corp.

Ralph R. Stafford has been named vice-president and group executive of sales and marketing; Philip C. Davy was named vice-president and group executive for technical operations; and William A. Hotmann was named a vice-president of the company.

In addition, John L. Robb and Howard B. Emerson have been named vice-presidents of manufacturing and systems development respectively.

Other Moves

■ Dearborn Computer Leasing Corp. has named Edwin Winclechter vice-president and sales manager, Ira E. Levy vice-president and treasurer and William B. Downey vice-president of Canadian operations.

■ Robert E. Wesslund has been named assistant to the president of Control Data Corp. and Paul M. Sibalik and Roger D. Shober have been named vice-presidents of the Washington, D.C. and Midwest regions respectively.

■ V. Orville Wright has been elected president and chief operating officer of MCI Communications Corp.

■ Donald M. Luby was elected president and Timothy W. O'Gorman vice-president of Wabash Tape Corp.

■ Bruce E. Colgrove has been named vice-president of marketing for CFI Memories, Inc.

■ Francis Leeman has been appointed president of Mohawk Data Sciences Corp.'s International Service Corp.

■ Allen D. Fleener has been appointed vice-president of marketing at Western Union Banking Systems.

■ Robert L. Miller has been named manager of applied systems marketing at Fabri-Tek, Inc.

■ Robert C. Marshall has been elected vice-president of manufacturing at Tandem Computers, Inc.

■ David C. Jung has been named vice-president of product management at Optimum Systems, Inc.

■ William F. Hancock Jr. has been named vice-president and general manager of Softech, Inc.'s Management Systems Division.

■ Ted Robinson has been appointed vice-president of the Infoton Division of Optical Scanning Corp.

■ Ray Fortune has been appointed Data General Corp.'s area manager for the UK and Benelux countries.

Orders & Installations

Vermont State Colleges has ordered an SI20 system from Harris Computer Systems Division to link five colleges in a time-sharing network.

The City of Riverside, Calif., has installed a Burroughs B2700 system to handle its accounting applications.

Landmark Communications Corp. has ordered four Logigraphic prepress automation systems from Logicon, Inc., including the LI-1000 computer, the Editorial Management System and the High Speed Wire Service System, to provide direct input from various wire services.

The Associated Dry Goods Division of Sibley, Lindsay and Curr in Rochester, N.Y., has installed 450 point-of-sale terminals from Datatrol, Inc., a subsidiary of Applied Devices Corp.

The Wine and Spirits Distributing Division of Foremost-McKesson, Inc. has installed a Burroughs B1700 to handle order entry, accounts receivable, billing and sales reporting for its three recently consolidated sales/distribution organizations.

Delta California Industries has installed 85 Sycor Model 340 terminals and associated peripheral equipment for two of its subsidiaries, Delta Lines and California Motor Express.

Texas Institute, Inc. has installed a 32K Burroughs B700 for student instruction.

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For Supervisory Controls

Oil Industry Mart Growing 12%/Year

By a CW Staff Writer

NEW YORK – The market for supervisory controls in the oil and natural gas industry, which is climbing at a rate of nearly 12% per year, will reach $2 billion by 1985, according to a study by Frost & Sullivan, Inc. (F&S), a market research firm here.

Revenues for such products were $500 million in 1975 and are expected to hit $1 billion in the next five years, F&S said.

Supervisory controls may be used in the production, transportation, refining and distribution of both oil and gas, and the F&S study covered all these phases.

Transportation and refining are both mature markets, the report noted. "Big technological advances will be needed for automatic control of distribution," it added, "but none are now on the horizon."

Supervisory controls in production is the segment that is "outpacing other market segments significantly, thereby offering the strongest opportunity," the report said.

It cautioned, however, that the marketplace is not a simple one to crack because purchase decisions tend to be made by personnel in field locations.

Integrated systems account for about 30% of the supervisory control market and major vendors such as TRW, ITT, Litton and Honeywell dominate the scene by building large-scale turnkey control systems for the oil operators.

Systems houses sold $177 million worth of instrumentation in this marketplace in 1975, a market that will increase to $630 million by 1985.

Engineering and construction firms now do $148 million worth of business in petroleum supervisory controls and will do more than $500 million by 1985, the F&S study said.

Equipment manufacturers that turn out sensors, transducers, activators, communications gear, displays, telemetry systems and computers will sell $260 million worth of supervisory control equipment to the petroleum industry this year and nearly $900 million worth by 1985, the study said.

Pipelines currently make up the biggest user category of supervisory control systems.

Pipeline networks that began using microwave communications for remote control in the late 1940s will continue to use such communications to read more data collection sensors that enable operators to respond to changing conditions and receive and transmit orders, the report noted.

Problem Area

Applying supervisory controls to oil refining has not been as successful, the report indicated, and oil companies approach use of closed-loop, digital control systems with caution.

However, "there is little doubt that within the next several years, some refineries will become computer-controlled," the report stated.

Supervisory control systems range from $3,000 for a land well to about $6,000 for an offshore well, compared with an average overall investment in a production well of $70,000.

By 1985, supervisory control systems for land wells will sell for about $4,600 and offshore well control systems will cost about $15,000. But the overall investment in a production well also will have climbed – to $120,000.

Demand for this equipment will exceed production through 1985 and amount to an annual shortfall on the order of about 10%, the report said.

Adapso Features 'Changing World' At April Meeting

MONTVALE, N.J. – The Association of Data Processing Service Organizations (Adapso) will examine "The Changing World of the Electronic Data Processing Industry" at its 44th Management Conference scheduled for April 5-7 in Atlanta.

F.G. (Buck) Rodgers, vice-president of marketing at IBM, will be the keynote luncheon speaker. He plans to discuss changes in technology and information handling, Adapso said.

Other speakers will include Quincy Rodgers, executive director of the Domestic Council on the Right of Privacy, and Lester Maddox, former governor of Georgia, who will speak on the ability of small business to survive impending government controls.

Workshop sessions will cover the use of intelligent terminals in the data center environment, the service firm going remote and IBM's 32 computer.

For further information on the conference, Adapso can be contacted at 210 Summit Ave. Montvale, N.J. 07645.

Semi Membership Up

MOUNTAIN VIEW, Calif. – The business membership of the Semiconductor Equipment and Materials Institute (Semi) increased 33% during 1975 from 122 to 162.

Individual memberships were up 38%.

Semi sponsors three Semicon shows each year, one on the West Coast, one on the East Coast and one in Europe. Semi is at 625 Ellis St., Mountain View Calif. 94043.

Expansions

Data 100 Corp. has moved its corporate headquarters to 6110 Blue Circle Drive in Minnetonka, Minn., adjacent to its 100,000 sq-ft central manufacturing plant.

Applied Digital Data Systems, Inc. has expanded its headquarters and production plant in Hauppauge, N.Y., to double its former 30,000 sq-ft size.

Modular Devices, Inc., a manufacturer of custom power supplies for DP applications, has initiated construction of a 23,000 sq-ft production and headquarters facility.

Computer Automation, Inc.'s Commercial Systems Division and Industrial Products Division have moved from corporate headquarters to facilities at 2400 Michelson Drive in Irvine, Calif., pending acquisition of a systems manufacturing plant.

Datasaab Systems, Inc., the U.S. subsidiary of Sweden's Saab-Scania, has opened a national distribution center at John F. Kennedy International Airport, New York.

Standard Memories, Inc., a wholly owned subsidiary of Applied Magnetics Corp., has moved its sales and marketing operations to Suite 105, 4120 Birch St., Newport Beach, Calif. 92660.

On-Line Systems, Inc. has moved into a four-story 45,000 sq-ft addition to corporate headquarters in Pittsburgh, Pa.

Information Terminals Corp. has broken ground for a $2 million, 37,400 sq-ft magnetic tape production facility in Sunnyvale, Calif.

Hewlett-Packard is constructing 154,000 sq-ft addition at Cupertino, Calif. which will increase operations to 488,000 sq ft of space.

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When not directly engaged in education, our staff enhances their professional skills by participating in data base consulting projects. Our list of clients includes corporate, academic & govt. organizations. Proficiency in both oral & written communication is therefore highly desirable. Send your resume including salary history and requirements to:

Stephen Robinson, Director, Professional Development, Performance Development Corporation, 32 Scotch Road, Trenton, N.J. 08628.

SYSTEMS ANALYST

Large suburban Detroit hospital has a challenging opportunity for an experienced Systems Analyst to assume responsibility for, and assist in, the design, implementation and operation of Teleprocessing Applications on an IBM 370/115 DOS/VS System. The successful candidate will be accountable to the Director of Data Processing and have extensive experience with CICS, COBOL, RPB II and BAL. Duties will also include the supervision of Programmer/Analysts and Computer Operators. Excellent salary and fringe benefits afforded the individual selected for this position.

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Consumers Power Company has openings for Systems Programmers with a thorough knowledge of OS/VS internals and assembler. Experience with OS/MVT-OS/VSL - HASP IV is desirable.

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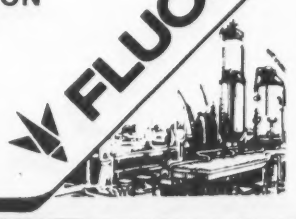

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San Francisco, CA	(415) 398-2888
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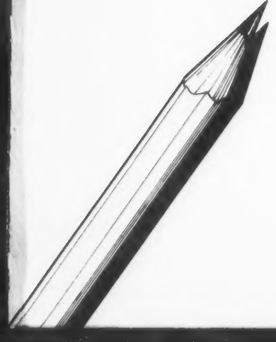

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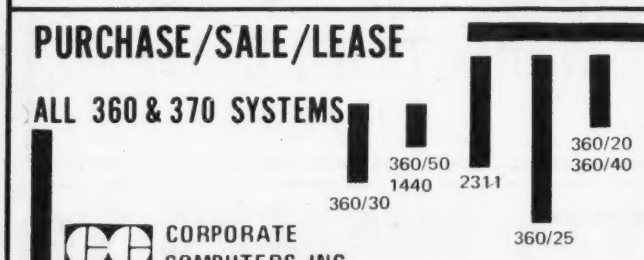

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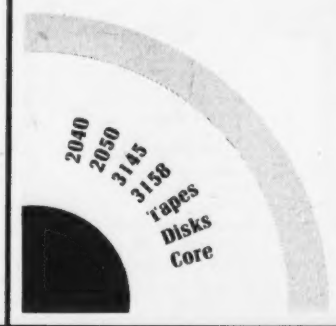

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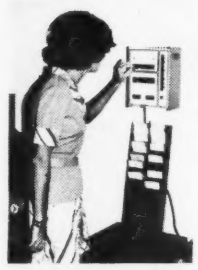

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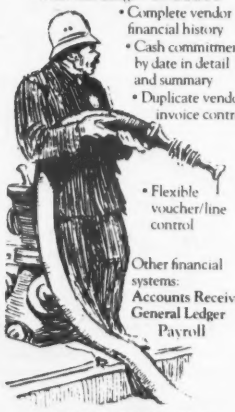

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Calcomp Shows Profit in Quarter

ANAHEIM, Calif. – Although California Computer Products, Inc.'s (Calcomp) second-quarter results were lower than those of the same period last year, they marked the first earnings after three successive quarters of losses.

The six-month results showed a loss of $3.1 million or 92 cents a share compared with earnings of $1.1 million or 33 cents a share in the year-ago period.

Revenues dropped to $58.2 million from $64.7 million in the same period last year.

During the quarter, the firm earned $131,000 or 4 cents a share compared with $270,000 or 9 cents a share in the same quarter last year.

Revenues were off slightly to $31.5 million compared with $31.9 million.

President Lester L. Kilpatrick said, "It is encouraging that Calcomp has come through a difficult period while maintaining continuity in our development programs and continuing the company position of strength in both end-user and OEM markets.

"We have new and competitive products available now and expect to add additional equipment in future periods in all of the areas in which we now compete.

"The control and reduction of costs while increasing productivity and revenues are the continuing goals of the company. We are optimistic that these goals are being met and expect to achieve improving margins in subsequent periods."

Write-Offs Affect Income At MSI in Three Months

COSTA MESA, Calif. – MSI Data Corp. wrote off $994,000 in inventory and wound up with third-quarter earnings of $2,663 compared with $472,042 or 24 cents a share in the same period last year.

Further write-offs for obsolete or excessive inventories are not contemplated, the firm said.

Revenues dropped to $7.9 million compared with $9.4 million in the same year-ago quarter.

For the nine months, the firm lost $1..1 million or 57 cents a share compared with earnings of $1.2 million or 62 cents a share in the same period last year, which included a $1.6 million charge from discontinued operations.

Revenues totaled $23.3 million compared with $25.2 million.

Backlog as of Dec. 27 was $7.7 million comared with $13.1 million at the same time last year. "Although the backlog is lower than last year at this time, it is firmer," President William J. Bowers, said.

"Much of last year's backlog was reduced by cancellations as the recession became increasingly severe," he said.

MSI's order rate has been steadily improving in the past two quarters, and by Jan. 31 backlog had increased to $8.5 million.

Loss Decreased for Third Period, Up for Nine Months at Fabri-Tek

MINNEAPOLIS – Although Fabri-Tek, Inc. reduced its third-quarter loss, the nine months loss was increased compared with the year-ago results.

For the nine months, the memory maker lost $931,000 or 25 cents a share compared with a loss of $119,000 or 3 cents a share in the same period last year.

Revenues declined to $21.6 million compared with $27.1 million in the year-ago period.

For the quarter, Fabri-Tek cut its loss to $252,000 or 7 cents a share compared with the loss of $557,000 or 15 cents a share in the same period last year.

Revenues dropped to less than $7 million compared with $8.1 million.

Picture Stabilized

President L.D. Altman said "indications are that our business picture has stablilized with third-quarter revenues being about the same as those in the second quarter.

"Assuming that the national economy continues to recover at recent rates, we expect our operations to show a gradual improvement throughout the fourth quarter and into our next fiscal year," he said.

First-Quarter Net Triples at AMS

SUNNYVALE, Calif. – Advanced Memory Systems, Inc.'s (AMS) earnings for the first quarter more than tripled.

Record earnings of nearly $1.2 million or 46 cents a share, including a tax credit of $557,000, compared with $306,000 or 12 cents a share, including a $150,000 tax credit in the same period last year.

Revenues also hit a new high of nearly $10 million compared with $7.5 million for the same quarter a year ago.

President Orion L. Hoch said, "We experienced a recovery in sales of semiconductor memory components in the first quarter, following nearly a year of overall softness in semiconductor markets.

"Systems revenues also were up during the quarter, as orders from new customers were reflected in operating results."

Index Lists DP Sites In Two Calif. Areas

PALO ALTO, Calif. – DP Index Co. said it has compiled lists of DP installations in the San Francisco Bay area and Los Angeles County.

The directories include name of firm, address, name of DP manager and what type of equipment the installation has, as well as whether it sells time.

The Los Angeles index costs $65; the San Francisco index $40 from the company at 999 Commercial St., Palo Alto, Calif. 94303.

Acquisitions

Data Card Corp. has acquired most of the assets of **Epic, Inc.**, a manufacturer of printer drums, for an undisclosed amount of cash and common stock.

Xerox Corp. has acquired **Daconics Corp.**, maker of a shared-logic word-processing system, for 89,319 shares of Xerox common valued at almost $4.5 million.

Scientific Software Corp. has acquired **Minerals Management, Inc.** in exchange for 119,782 shares of Scientific's common stock.

Systematics, Inc. has acquired **Sys Con, Inc.**, a supplier of software packages.

McDonnell Douglas Automation Co. has agreed to acquire the assets and business of **United Computing Corp.** at a price equivalent to $3/share for the 504,995 shares outstanding.

Multiple Access, Inc., a subsidiary of Multiple Access, Ltd., has agreed to acquire Greyhound Computer Corp.'s **Los Angeles Data Center** services. Multiple Access will assume customer contracts, employees and services of the data center.

Xylogic Systems, Inc. has acquired **Interface Corp.**, a minicomputer interface and controller manufacturer, for an undisclosed amount of cash and stock. The Interface operation will become the Xylogic OEM Components Group.

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COMDISCO®

THE CREATIVE COMPUTER PEOPLE

Earnings Reports

GOULD
Three Months Ended Dec. 31

	1975	1974
Shr Ernd	$1.04	$.99
Revenue	198,231,000	205,176,000
Earnings	10,207,000	9,511,000
6 Mo Shr	1.94	1.85
Revenue	375,333,000	412,373,000
Earnings	19,180,000	17,963,000

GRAHAM MAGNETICS
Three Months Ended Dec. 31

	1975	1974
Shr Ernd	$.44	$.41
Revenue	4,446,249	4,322,597
Earnings	416,621	383,008
6 Mo Shr	.64	.70
Revenue	8,174,610	8,248,293
Earnings	600,563	662,982

MEMOREX
Year Ended Dec. 31

	1975	1974
Shr Ernd	$3.80	.....
Revenue	263,994,000	$217,627,000
Spec Cred	a9,777,000	.....
Earnings	18,022,000	(8,972,000)
3 Mo Shr	1.21	.....
Revenue	69,758,000	59,569,000
Tax Cred	b2,631,000	.....
Earnings	5,859,000	(2,533,000)

a-Consists of $2 million gain on the purchase of debentures and $7.8 million from a tax-loss carryforward. b-Tax-loss carryforward.

PERTEC
Three Months Ended Dec. 26

	1975	1974
Shr Ernd	$.24	$.20
Revenue	13,014,000	11,538,000
Earnings	753,000	619,000
6 Mo Shr	.51	.31
Revenue	25,559,000	21,540,000
Earnings	1,627,000	960,000

XEROX
Year Ended Dec. 31

	1975 (000)	a1974 (000)
Shr Ernd	$3.07	$4.14
Revenue	4,053,760	3,505,370
Disc Op	(97,325)	(18,620)
Earnings	244,307	329,257
3 Mo Shr	.98	1.03
Revenue	1,055,828	963,968
Disc Op	.....	(3,673)
Earnings	77,709	81,916

a-Restated.

COMSHARE
Three Months Ended Dec. 31

	1975	1974
Shr Ernd	$.08	$.21
Revenue	3,225,429	2,737,545
Tax Cred	49,000	133,000
Earnings	102,480	287,011
6 Mo Shr	.30	.58
Revenue	6,675,093	5,640,059
Tax Cred	197,000	373,000
Earnings	404,280	788,011

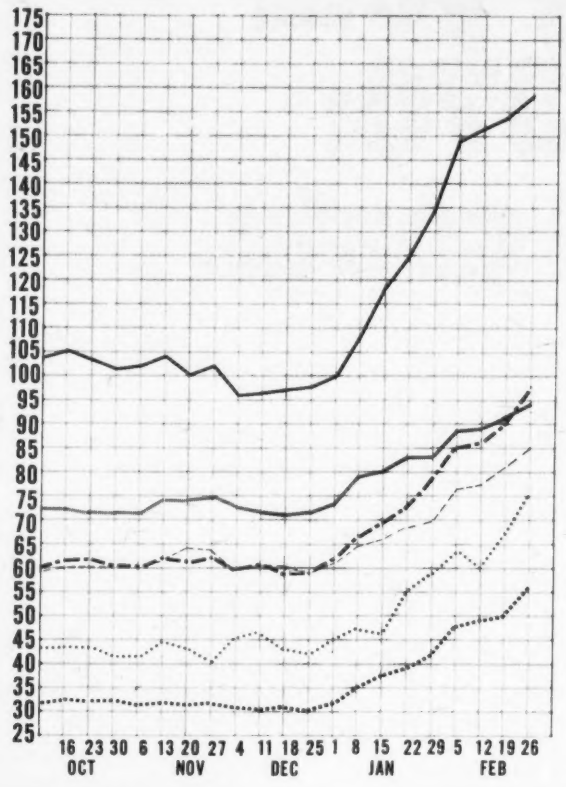
DATAPRODUCTS
Three Months Ended Dec. 27

	1975	a1974
Shr Ernd	$.26	$.21
Revenue	22,786,000	22,648,000
Earnings	1,750,000	1,406,000
9 Mo Shr	.72	.63
Revenue	61,688,000	65,229,000
Earnings	b4,882,000	4,291,000

a-Restated to treat Data Card Corp. as unconsolidated subsidiary. b-Includes $739,000 gain from sale of Data Card shares.

COMPUTERWORLD Computer Stocks Trading Indexes

Computer Systems — Software & EDP Services
Peripherals & Subsystems — Leasing Companies
Supplies & Accessories — CW Composite Index



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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, FEBRUARY 25, 1976

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1975-76 PRICE RANGE (1)	CLOSE FEB 25 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-109	103 5/8	+ 3/8	+0.3
O	COMPUTER AUTOMATION	2- 17	14 3/8	- 3/8	-2.5
N	CONTROL DATA CORP	11- 26	25 1/8	- 1/8	-0.4
N	DATA GENERAL CORP	10- 51	50 3/4	+3 5/8	+7.6
O	DATAPOINT CORP	6- 37	34 1/4	-1 3/4	-4.8
O	DIGITAL COMP CONTROL	1- 4	3 3/4	0	0.0
N	DIGITAL EQUIPMENT	46-166	163 5/8	+5 5/8	+3.5
N	ELECTRONIC ASSOC.	2- 5	4 1/2	- 1/4	-5.2
A	ELECTRONIC ENGINEER.	5- 13	13	+1 1/4	+10.6
N	FOXBORO	23- 42	36 5/8	+ 1/8	+0.3
O	GENERAL AUTOMATION	4- 14	9 5/8	+ 7/8	+10.0
O	GRI COMPUTER CORP	1- 1	1	0	0.0
N	HEWLETT-PACKARD CO	58-120	108 3/4	-1	-0.9
N	HONEYWELL INC	22- 56	56	+3 1/2	+6.6
N	IBM	158-264	260	+4 1/4	+1.6
C	MANAGEMENT ASSIST	1- 1	1 3/8	0	0.0
O	MEMOREX	1- 15	19 5/8	+4 7/8	+33.0
O	MICRODATA CORP	2- 21	20	+ 3/8	+1.9
O	MODULAR COMPUTER SYS	5- 19	10 1/4	-1	-8.8
N	NCR	15- 39	28 5/8	- 7/8	-2.9
O	PRIME COMPUTER INC	2- 9	8	+1	+14.2
N	PERKIN-ELMER	16- 33	23 3/4	-1 3/8	-5.4
N	RAYTHEON CO	26- 59	51 3/4	+3	+6.1
N	SPERRY RAND	26- 49	47 3/8	+1 3/8	+2.9
O	SYCOR INC	5- 31	28 1/4	- 1/2	-1.7
A	SYSTEMS ENG. LABS	1- 9	8 7/8	+1 3/4	+24.5
N	VARIAN ASSOCIATES	7- 18	15 7/8	- 7/8	-5.2
N	WANG LABS.	7- 19	17 3/4	-1 1/4	-6.5

LEASING COMPANIES

EXCH		1975-76 PRICE RANGE (1)	CLOSE FEB 25 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	1- 3	8 1/8	+1 3/8	+20.3
A	COMMERCE GROUP CORP	2- 4	3	+ 1/8	+4.3
A	COMPUTER INVSTRS GRP	1- 3	2	+ 5/8	+45.4
M	CONTRONIC RENTAL	1- 1	5/8	+ 1/4	+66.6
A	DCL INC	0- 1	7/8	+ 1/4	+55.4
N	DPF INC	3- 7	6	- 1/8	-2.0
O	EDP RESOURCES	1- 2	1	0	0.0
A	GRANITE MGT	1- 5	4 1/2	0	0.0
A	GREYHOUND COMPUTER	2- 4	4	0	0.0
N	ITEL	3- 11	10 5/8	+ 7/8	+8.9
N	LEASCO CORP	4- 14	11 1/4	-1 1/2	-11.7
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
C	NRG INC	0- 4	1/4	0	0.0
A	PIONEER TEX CORP	2- 9	8 5/8	+ 1/2	+6.1
A	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	10 3/4	- 1/2	-4.4

SOFTWARE & EDP SERVICES

EXCH		1975-76 PRICE RANGE (1)	CLOSE FEB 25 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 1	7/8	0	0.0
A	APPLIED DATA RES.	1- 10	3 1/8	+ 5/8	+25.0
N	AUTOMATIC DATA PROC	29- 65	62 3/4	+1 3/4	+2.8
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
C	COLEMAN AMERICAN COS	4- 6	4 7/8	- 1/8	-2.5
O	COMPUTER DIMENSIONS	2- 6	5 7/8	- 1/8	-2.0
O	COMP ELECTION SYSTMS	3- 7	5 1/2	+ 1/4	+4.7
O	COMPUTER HORIZONS	1- 1	1/2	0	0.0
O	COMPUTER NETWORK	1- 5	4 1/4	+ 3/8	+9.6
N	COMPUTER SCIENCES	7- 9	7 1/8	+ 3/4	+11.7
O	COMPUTER TASK GROUP	1- 1	1	+ 1/8	+14.2
O	COMPUTER USAGE	2- 4	3 5/8	+ 1/2	+16.0
O	COMSHARE	2- 4	2 3/4	+ 1/4	+10.0
O	COMTEN INC	1- 8	7 1/4	- 1/8	-1.6
O	DATATAB	1- 2	1	0	0.0
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	11- 28	15	- 7/8	-5.5
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	1	+ 1/8	+14.2
O	KEANE ASSOCIATES	2- 3	3 1/8	- 5/8	-16.6
O	KEYDATA CORP	2- 4	4 1/4	+1	+33.7
O	LOGICON	3- 5	4 3/8	+ 1/4	+6.0
A	MANAGEMENT DATA	1- 3	2 3/8	+ 1/4	+11.7
A	NATIONAL CSS INC	6- 25	23 1/2	+1 1/8	+5.0
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 20	19 3/8	-1 1/4	-6.0
N	PLANNING RESEARCH	2- 6	4 1/8	- 3/8	-8.3
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	2- 5	4 1/2	- 3/8	-7.6
O	REYNOLDS & REYNOLD	10- 24	19	-1	-5.0
O	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1	0	0.0
O	TYMSHARE INC	7- 28	27 3/4	+ 1/2	+1.8
A	UPS SYSTEMS	2- 4	4	+ 1/2	+14.2
N	WYLY CORP	2- 7	6 1/8	+2 1/8	+53.1

PERIPHERALS & SUBSYSTEMS

EXCH		1975-76 PRICE RANGE (1)	CLOSE FEB 25 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 13	11 1/4	-1 3/4	-13.4
O	ADVANCED MEMORY SYS	1- 10	9 7/8	+1 5/8	+19.6
N	AMPEX CORP	3- 8	7 3/8	- 3/4	-9.2
O	ANDERSON JACOBSON	1- 4	3 5/8	+ 7/8	+31.8
C	BEEHIVE MEDICAL ELEC	1- 5	4 3/4	0	0.0
A	BOLT,BERANEK & NEW	5- 13	7 7/8	+ 7/8	+12.5
N	BUNKER-RAMO	4- 8	6 7/8	+ 3/8	+5.7
A	CALCOMP	3- 7	6	+ 1/2	+9.0
O	CAMBRIDGE MEMORIES	1- 5	2 7/8	+ 1/8	+4.5
N	CENTRONICS DATA COMP	7- 35	29	+ 1/8	+0.4
O	CODEX CORP	15- 39	33 1/2	+6 1/2	+24.0
O	COGNITRONICS	1- 2	1 1/4	+ 3/8	+42.8
O	COMPUTER COMMUN.	1- 2	3 1/8	+ 1/4	+8.6
O	COMPUTER CONSOLES	3- 7	6	+ 3/4	+14.2
A	COMPUTER EQUIPMENT	1- 3	2 1/2	+ 5/8	+33.3
O	COMPUTER MACHINERY	1- 2	2 1/8	+ 1/4	+13.3
O	COMPUTER TRANSCEIVER	1- 2	1 7/8	+ 7/8	+87.5
O	COMTEN	2- 8	7 1/4	- 1/8	-1.6
N	CONRAC CORP	12- 30	22 1/8	-1 1/8	-4.8
O	DATA ACCESS SYSTEMS	1- 3	2	0	0.0
O	DATA 100	5- 16	10 1/2	+1 1/2	+16.6
A	DATA PRODUCTS CORP	2- 11	11	+1 1/4	+12.8
O	DATA TECHNOLOGY	1- 3	2	+ 1/8	+6.6
O	DATUM INC	1- 2	1 3/8	+ 1/4	+22.2
O	DECISION DATA COMPUT	2- 7	3 1/2	+ 3/8	+12.0
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DIVAN CONTROLS	1- 1	3/4	+ 1/4	+50.0
N	ELECTRONIC M & M	1- 3	2 3/4	- 1/4	-8.3
O	FABRI-TEK	1- 1	1 1/8	+ 1/8	+12.5
C	GENERAL COMPUTER SYS	1- 2	1 3/4	0	0.0
N	HAZELTINE CORP	3- 12	12 1/8	+2 5/8	+27.6
N	HARRIS CORP	18- 46	44 1/2	+4 7/8	+12.3
A	INCOTERM CORP	3- 17	17 1/4	+1 5/8	+10.3
O	INFOREX INC	2- 7	6 1/2	+1 3/4	+36.8
O	INFORMATION INTL INC	8- 19	18	+2 3/8	+15.1
C	INTEL CORP	21- 99	97	+5 1/2	+6.0
A	LUNDY ELECTRONICS	3- 7	6 1/4	- 1/4	-3.8
O	MSI DATA CORP	3- 10	6	+1 1/2	+33.3
A	MILGO ELECTRONICS	8- 24	18	+ 1/8	+0.6
N	MOHAWK DATA SCI	1- 7	6 1/2	+1 3/8	+26.8
O	OPTICAL SCANNING	1- 3	1 3/8	0	0.0
C	PEARL CORP	1- 2	1 1/4	0	0.0
A	PERTEC CORP	2- 8	7	+ 3/8	+5.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INSTR.	1- 1	1 1/2	0	0.0
O	QUANTOR CORP	2- 6	4 3/4	- 3/8	-7.3
O	RECOGNITION EQUIP	2- 9	8 3/8	- 3/8	-4.2
N	SANDERS ASSOCIATES	3- 11	9 3/4	0	0.0
O	SCAN DATA	1- 4	3 1/2	+1 3/8	+64.7
O	STORAGE TECHNOLOGY	6- 17	11 3/8	- 1/8	-1.0
O	T BAR INC	3- 10	9 3/4	+2 3/8	+32.2
O	TALLY CORP.	1- 6	5 1/8	+ 1/8	+2.5
O	TEC INC	1- 4	3 1/2	0	0.0
N	TEKTRONIX INC	18- 60	56	-3	-5.0
N	TELEX	1- 4	4	+ 3/8	+10.3
O	WANGCO INC	4- 15	13 3/4	-1 1/4	-8.3
O	WILTEK INC	1- 4	2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1975-76 PRICE RANGE (1)	CLOSE FEB 25 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 3	1 3/8	0	0.0
O	BALTIMORE BUS FORMS	4- 5	5	0	0.0
A	BARRY WRIGHT	5- 9	8 7/8	+1	+12.6
O	CYBERNATICS INC	0- 1	1/4	0	0.0
A	DATA DOCUMENTS	29- 42	39 3/4	- 1/2	-1.2
O	DUPLEX PRODUCTS INC	12- 25	17 1/2	-5 1/2	-23.9
N	ENNIS BUS. FORMS	5- 8	7 1/2	- 1/8	-1.6
O	GRAHAM MAGNETICS	5- 13	12	+ 1/2	+4.3
O	GRAPHIC CONTROLS	8- 21	17 1/2	+1 1/4	+7.6
N	3M COMPANY	43- 68	57 1/2	- 7/8	-1.4
O	MOORE CORP LTD	39- 51	47 1/4	+ 3/4	+1.6
N	NASHUA CORP	9- 22	14 7/8	- 7/8	-5.5
O	STANDARD REGISTER	11- 20	17 1/2	+ 1/4	+1.4
O	TAB PRODUCTS CO	4- 8	7 1/2	+1	+15.3
N	UARCO	17- 25	24 5/8	+1	+4.2
O	VANIER GRAPHICS CORP	4- 7	7 1/4	+2 1/4	+45.0
A	WABASH MAGNETICS	3- 8	7	+ 3/8	+5.6
N	WALLACE BUS FORMS	15- 25	23 3/4	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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